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PERCIVAL SHELDON RIDSDALE, Editor

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Photograph by courtesy Brown & Dawson, N. Y.

THE CORYPHA TREE, AT ST. GEORGES, GRENADA

This tree is remarkable for the fact that it lives ten years, bears flowers and fruit, and then dies.

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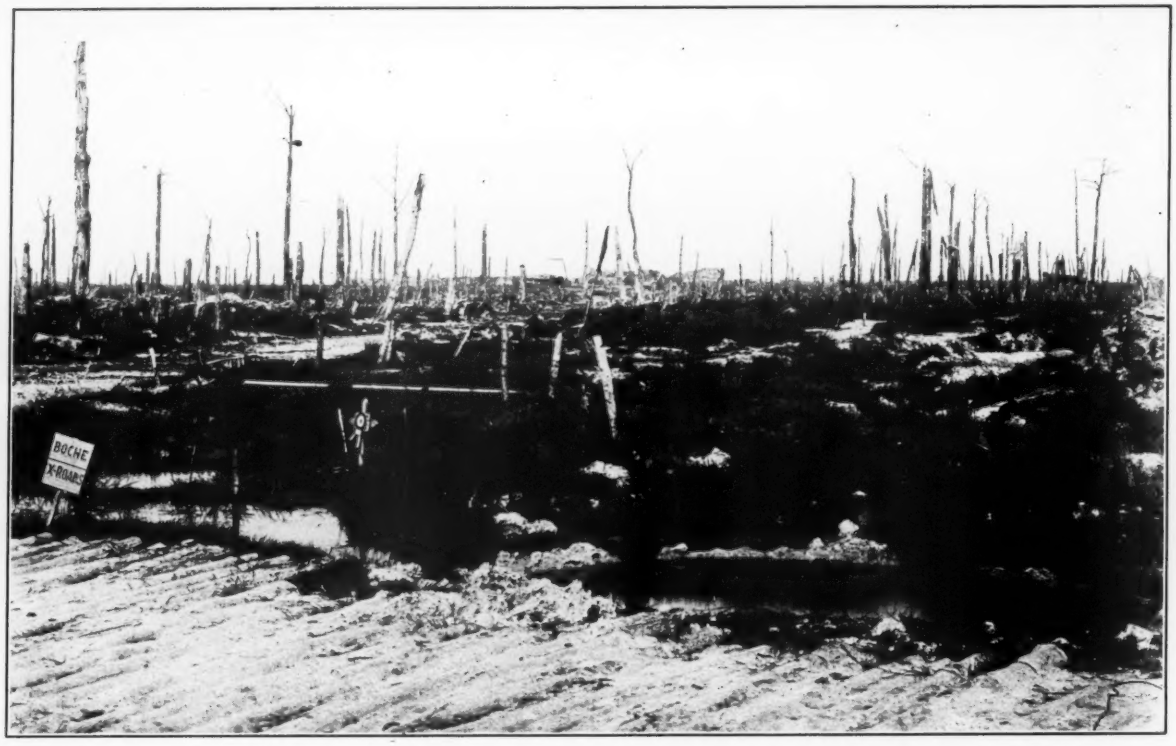

THIS SCENE NEAR BOESINGHE, BELGIUM, INDICATES HOW THE GERMANS USED VAST QUANTITIES OF BELGIAN TIMBER IN BUILDING ROADS ON LOW GROUND. THE TREES STILL STANDING ARE DEAD, SHATTERED BY SHELL AND GUN FIRE.

THE CONDITION OF THE PARK OF A CHATEAU NEAR MERCKEN, BELGIUM, AFTER EXTENSIVE TIMBER CUTTING BY THE GERMANS AND SOME SHELLFIRE. NOTHING LIVING IS LEFT STANDING.

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BELGIUM'S FORESTS BLIGHTED BY THE HUN

BY PERCIVAL SHELDON RIDSDALE

EDITOR OF AMERICAN FORESTRY MAGAZINE

BRUSSELS, BELGIUM.

THE Germans practically destroyed the forests of Belgium during their four years' occupation of the conquered territory. A few small areas of wooded land still remain, but the trees are standing only because the Germans in their hurried retreat followed by their speedy acceptance of the armistice found insufficient time in which to complete their work of destruction.

Several hundred million dollars' worth of trees were destroyed, and the four provinces of Hainaut, Liege, Luxemburg and Namur suffered most severely.

Protests against the wholesale destruction of standing timber, and the deliberate damage of young growth so that it could not survive were made to General Baron von Bissing, Governor General of Belgium, by the Belgian Forest Administration and by the Central Forestry Society of Belgium, without avail, and the systematic and scientific destruction of the forests and woodlands continued during the entire period of the occupation.

Belgium's forest area, 1,299,450 acres constituted about 17% of the entire area of the country, whereas one-fourth of the German Empire and one-third of Saxony, Bavaria, Wurtemberg and Baden is in forest. As Belgium is without doubt one of the heaviest lumber consuming nations of the world, in view of the density of her population and the needs of her industries, these German forests will undoubtedly be compelled to restore the lumber Belgium has lost, but only the long years can restore her forests. Meanwhile, the effect of changes of climate due to loss of her forests may cause damage impossible to estimate, to add to the many injuries already sustained by this unhappy country.

The situation is well expressed by a report of the Central Forestry Association of Belgium, of which Count Visart de Bocarme, the heroic Mayor of Bruges, is president, which says: "In 1914 the wind of Liberty still blew in the rich foliage of our forests, which were, alas! soon to become acquainted with the axe of the vandals. For, during that dark period of fifty-two months, after committing every manner of crime, they also perpetrated the monstrous felony of laying low our forests; for let us remember that they have cut down several hundred millions worth of our trees.

"Everything went—venerable shade trees of the roadside, the parks, and the fields, elms and poplars; experimental trees, exotic or curious; historical trees; forest trees such as oaks, ash, beech, or of the orchard, such as walnut trees; massive growths of both deciduous and indeciduous varieties; forests belonging to the nation, to communes, to charitable institutions, or to private individuals; nothing was spared, old or young, tall timber or coppice wood, not even the bedding.

"They had set out to leave nothing standing when they were finally compelled to let go under the irresistible pressure of our victorious troops, and in some cases left their cutting unfinished."

Much was done by the Belgians during the four years in the effort to save some of the forests, to have the young growth protected even if the usable trees had to be sacrificed. Notes, protests, appeals, supplications, were made to the German officials, but all without other result than curt refusals to modify the orders for steady and systematic destruction which were being issued from time to time.

To General Baron von Bissing was pointed out the fact, so familiar to every German officer, that a certain area of forest is absolutely essential to the prosperity and even the vitality of a nation, a truth put into application with jealous care in the various states of Germany. He was told that in Belgium for the last twenty-five or thirty years, the nation, the provinces, the communes, and numerous owners have united their efforts with a view to increasing the forested area, which was obviously insufficient, in view of the imperative needs of the nation in the way of timber, as well as out of consideration for

Belgium, eager for the restoration of her destroyed forests, has gratefully accepted the offer of the American Forestry Association to aid by presenting American forest tree seed. Belgium's director of forests, N. I. Crahay, has asked for quantities of the following seed:

NOBLE FIR, GRAND FIR, WHITE FIR, SILVER FIR, WESTERN LARCH, DOUGLAS FIR, PORT ORFORD CEDAR, BALD CYPRESS, TIDELAND SPRUCE, PIN OAK, RED OAK, SUGAR MAPLE, SILVER MAPLE AND TULIP POPLAR.

The American Forestry Association is now soliciting contributions to a fund to provide this seed and also to provide seed for the replanting of the devastated forests of France.

the numerous and valuable indirect services which forests render from the standpoint of climate, water supply, etc.

It was also indicated that the forests were young and of recent creation, and their yield of lumber as well as their general output comparatively small, for the area of mere coppice wood and of timber of small value or utility constituted about one-fourth of the whole.

Numerous plantations had been established, some in order to protect regions against dominating or drying winds, others for the sake of clothing hills and elevated plateaus with a view to preventing disastrous overflows of water courses which prevailed prior to the establishment of these plantations. The removal of these woods which served as a defense against the elements would cause not only considerable losses but even a public danger as a result of the probable inundations, not only in Belgium but even in Holland, if, for instance, the hills of the basin of the Meuse and its affluents were stripped. It would certainly provoke legitimate protests on the part of the injured owners, who would find their crops reduced in consequence of the absence of the shelters which protected them, or ravaged by the torrents which would be sure to arise following the denudation of the hillsides.

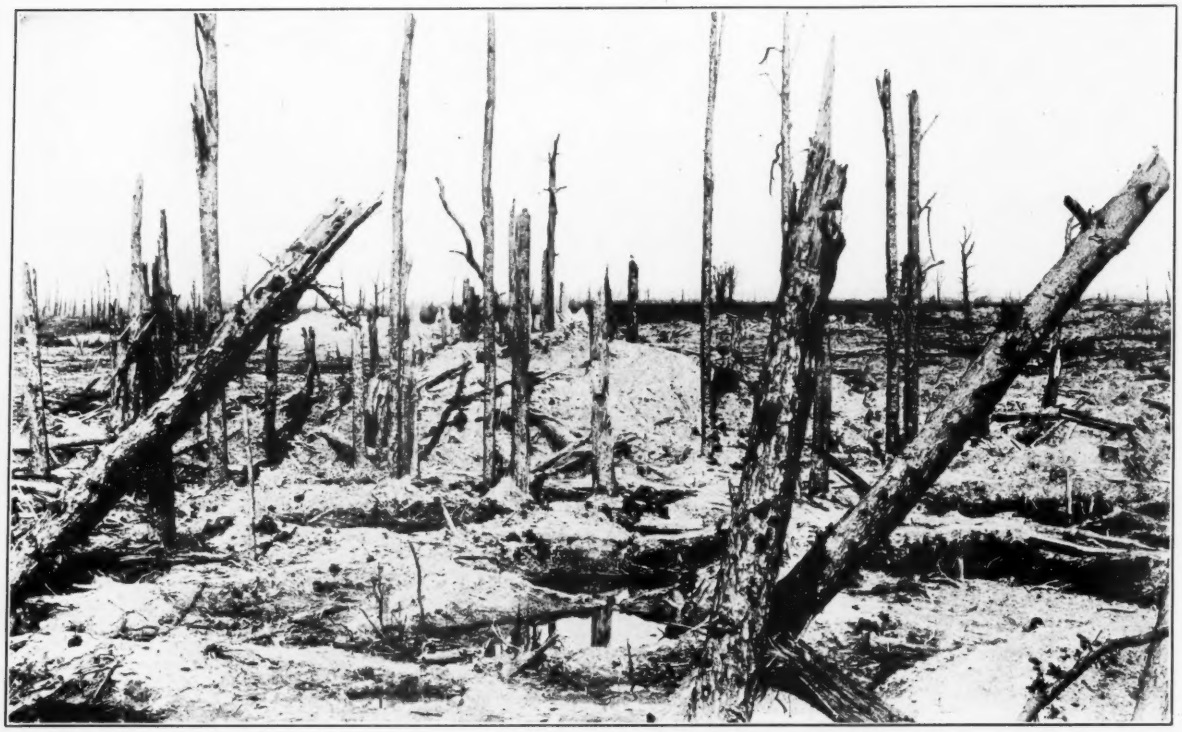
The Forestry Society even pointed out that the stipulations of the international convention signed at The Hague protected the forests of occupied enemy territory, and said in an appeal to Von Bissing:

"We are compelled to protest against the seizure of our forests, all the more energetically because we consider ourselves protected in this highly grave matter by the stipulations of the international convention signed at The Hague on October 18, 1907.

"As a matter of fact, as regards the Government forests, article 55 of this convention provides that the occupying Nation shall be considered only as an administrator and usufructuary of this property and shall be obliged to administer it in accordance with the rules on usufruct.

"Now, the exploitation of these forests is regulated according to the Belgian laws on the basis of methodical arrangements which determine the areas and amounts to be cut annually.

"As regards the forests of communes and of private parties, article 52 stipulates particularly that requisitions in kind shall be made against communes and inhabitants only for the needs of the army of occupation.



SUCH SCENES AS THIS IN BELGIAN FORESTS AND WOODLANDS ARE NOT UNUSUAL. THERE ARE SCORES AND SCORES LIKE THIS AND WORSE. THE DIFFICULTY OF THE PROBLEM OF RESTORATION IS APPARENT AT A GLANCE.

"Now, it does not seem to us possible that the army of occupation alone could use the large quantities of wild pine, spruce, beech, oak, and walnut that have been cut down, taken out, and seized by the German military authority.

"The same article also stipulates that these requisitions shall be in proportion to the resources of the country and of such a nature as not to impose upon the population the obligation of taking part in the operations of the war against their own country.

"Now, according to the considerations set forth above, we are convinced that the timber that is now being taken is out of all proportion to the extremely limited timber resources of Belgium, which are already exceeded by the needs of the natives."

A WOODLAND NEAR MERCKEN IN BELGIUM, SHOWING THE REMAINS OF WHAT WAS ONCE A ROAD RUNNING THROUGH THE MIDDLE OF THE PHOTOGRAPH. WOODLANDS IN THE DISTANCE WERE SAVED DOUBTLESS BECAUSE IT WAS TOO DIFFICULT TO GET OUT THE TIMBER.

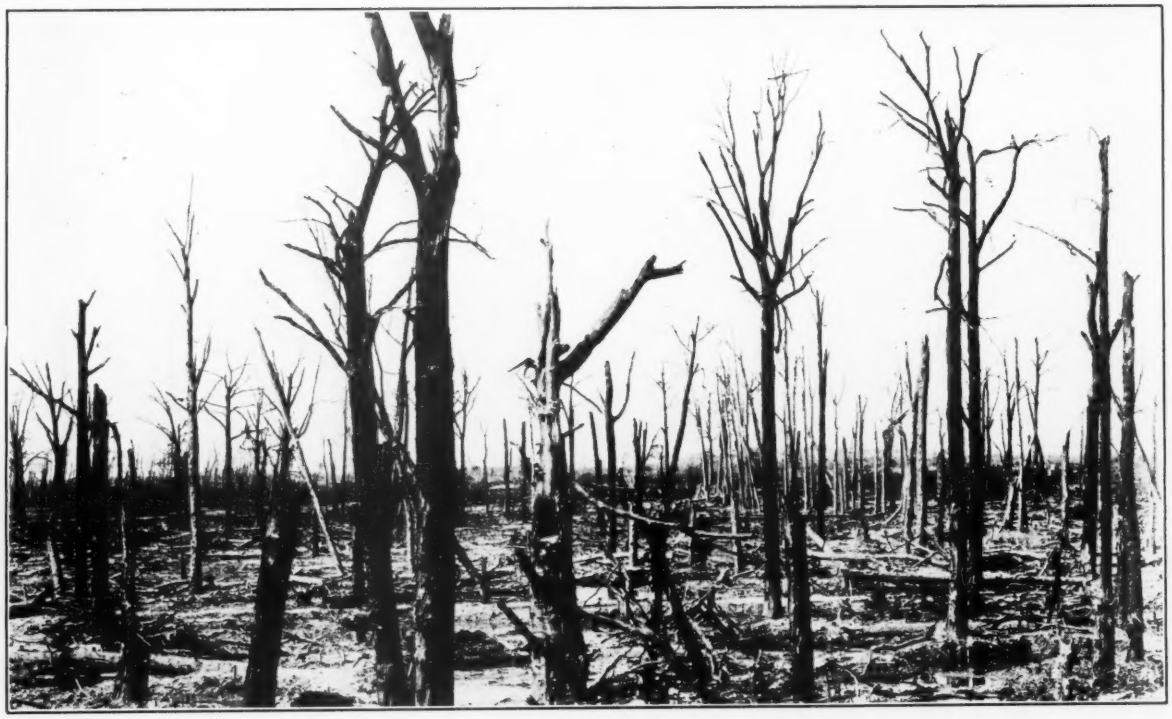
The effect of this protest may readily be guessed. Von Bissing, in a brief note, replied that the explanations could not induce him to revoke or modify the measures taken, and added that the cuttings were on so small an area that "it is impossible for any of the injuries which you fear to occur." The Forestry Society comment on this was:

"Let us merely say that it is a wonder that its author did not say that not only have we no injury to fear but that these cuttings were ordered in the interests of our people and of our forests." The Belgians, still brave, still hopeful, still deeply concerned, endeavored by submitting forceful statistics on the situation to Von Bissing to secure some modification of the campaign of destruction. This was sent him:

"We see there that the total area of *indeciduous* forest in the kingdom is 424,150 acres, divided into 138,685 acres under the forestry administration and 285,465 acres belonging to private parties.

"The sale price of the exhaustive cuttings in the inde-

LE BOIS DES LUPINS, NEAR BOESINGHE, BELGIUM, SHOWING THE EFFECT OF HEAVY SHELLFIRE ON THE GROUND AND ON THE TREES. SUCH DAMAGE EXISTS FOR A WIDE AREA IN THIS SECTION.



THE PARK OF A BELGIAN ESTATE OCCUPIED BY THE GERMANS. HERE TIMBER WAS CUT AND PRACTICALLY ALL OF THE UNCUT TREES WERE KILLED BY FIRE AND SHELLS. MANY OF THE FINE PARK LANDS OF BELGIUM ARE IN A SIMILAR CONDITION.

ciduous forests under the forestry administration having been 577,419 francs in 1910, we can infer from this that, for the total area of indeciduous forests, the proceeds of the exhaustive cuttings amounted in 1910 to approximately 1,765,165 francs, representing a total volume of 126,083 cubic meters.

"According to the same data we find that in 1910, in regard to the provinces of Hainaut, Liege, Luxemburg, and Namur, as referred to in Your Excellency's answer, the area of indeciduous forests is 204,158 acres, the proceeds from exhaustive cuttings 859,615 francs, and the volume exploited 61,401 square meters.

"The revenues of the preceding years are practically the same as those of 1910, and may be considered as normal and as representing the maximum yield.

"Now, Your Excellency writes us that, according to anticipations, the cuttings of indeciduous timber will not exceed an area of 4,940 acres in these four provinces.

"This area will be taken from the growths offering the heaviest dimensions and representing a present value of 12,500,000 francs at the least.

"This quantity therefore considerably exceeds not only the maximum yield of the four provinces contemplated, of which we did not even deduct the forests comprised in the line-of-communications zone, but it also exceeds that of the whole country.

"Under these circumstances, and inasmuch as it has already been necessary, for the needs of the Nation under present conditions, to dig deeply for the last two years into our forest reserve by means of extraordinary cuttings, it is to be foreseen that, through the fellings contemplated, the resinous lumber resources of Belgium will be reduced beyond all proportion, if indeed they are not exhausted completely for the years to follow."

To this Von Bissing, evidently short of arguments and without doubt somewhat peeved, said he was familiar with the statistics and "I cannot deduce therefrom any reason for suspending or modifying my instructions."

There was nothing further to be done. The cutting of usable trees and the destruction of the young growth continued.

The damage done to the various forests is indicated in the following reports of the Forestry Society now available:

"The operations of the occupying nation had begun—one must break one's hand in in all things—by cutting down the resinous trees. As early as July 7, 1916, we were informed of the seizure of the resinous forests belonging notably to the communes of Chimay and Forges, to Mr. F. Brugmann in the territory of Escaillere and of the Riezes, and to Mr. Ch. Malengreau in the commune of Macquenoise.

"The exploitation of the spruces on the Revers d'Oise and in Fagne, the two cantons belonging to the city of Chimay, and that of the wild pines, in the commune of Forges, was carried out quickly; the case was the same with wild pines about sixty years old, planted as tall sentinels at the entrance of the oak groves of the commune of Salles and in regard to which they already dispensed with the formality of sending a notice of seizure. This latter cutting was exploited at the end of September, 1916; it was the same way with some spruces which the

communes of Seloignes and Forges-Philippe owned on one of the heights of their forests of Thierarche.

"It took more time to fell the splendid mass of spruces of the Hauts-Marais. This forest was assuredly the most beautiful of this kind that existed in Belgium, great spruces planted about 1862 and whose spires seemed to reach the sky in the darkness which their thick branches left on the ground. This beautiful mass no longer exists; all the spruces, and with them large quantities of trees which grew in the forest proper, along walks and borders, all have disappeared for the satisfaction of the needs of the occupier, who never cared, of course, to indemnify the owner. What is more, for we can never get done telling the misdeeds of the Germans in Belgium, groups of exotic trees such as Japanese larches, Douglas firs, etc., remarkable for their vigor and their dimensions, found no more mercy before the axe of the vandals than did the ordinary spruces.

"At the same time there were being exploited in Thierarche, on the territory of Macquenoise, pine woods mixed with birch. The Germans had constructed a Decauville railroad in order to transport the timber to the railroad station at Momignies. On this track was a wheezy locomotive pulling a car which contained at most one and one-half cubic meters of wood; and good people, good Belgians at that, were nevertheless admiring the spirit of organization of the usurpers!

"The quantity of oaks concentrated in the forests of the Chimay region and the situation of the forested areas with respect to the railroad stations adapted to the German enterprises, are likewise the reasons why the Thierarche forests had to suffer worse than those of Fagne.

"In view of the stoppage of business the greater part of the communes had failed to sell the oaks of the cuttings of 1915 and following. On the contrary all the white wood, which is suited to the manufacture of wooden shoes—the only local industry that kept up during the war—all the white wood had been sold as soon as the exploitation of the copse had permitted operations of timber selection. This was in fact all timber saved from the break-up and turned over to Belgian industry for the consumption of the interior of the country, but it was necessary to be disillusioned soon on this point also with respect to the honesty of our adversaries.

"The high oak forests of Bourlers and Forges were attacked first; while the felling of communal forests took place in violation of all rights and conventions. We must recognize that here at least the frenzied desire to injure and destroy the forest, to wipe out the forest reserve and all resources for the future, this bad desire, we will say, does not appear. Only the larger trees fell, and enough others were preserved so that the forest still has the appearance of high timber over a thin copse. However, all the big oaks are felled; as a matter of fact, they constitute the bulk of the value.

"While matters did not transpire so badly for these two communes, it was different with others, whose misfortunes we shall recite.

"The forest of Monceau-Imbrechies, traversed from south to north by the road from Monceau to Seloignes, reached the facilities of the Seloignes-Monceau railroad

STURDY TREES IN A PARK IN BELGIUM WHICH SUSTAINED HEAVY SHELL AND MACHINE GUN FIRE AND STILL STAND, SKELETON DEAD, FILLED WITH BULLETS AND SHRAPNEL SCRAP.

station. It was one of the richest forests in the region, well served by two metaled roads, and situated between the railroad station and the locality which comprises many makers of wooden shoes, all being circumstances which gave value to the various classes of timber. Its big oaks, while not all of excellent quality, were known far and wide and offered dimensions little known elsewhere. One of these veterans measured 13¾ feet at a height of five feet, and was 53 feet high; it was named the Big Benefit Oak. Individuals from 6 feet to 8 feet in diameter were common there, those measuring from 8 feet to 11 feet were not rare, and there were several gauging 11 feet and over. Groups of beeches, modern and ancient, were met with and distinguished themselves by an exceedingly rapid growth. Tall birches and big sycamore maples completed this fine high-timber forest.

"To this forest were given the names of Tailles Andre, Benefice, Richots, Mauvais Pas, and Atelier; the cuttings dated from 1906 to 1917. Apart from the high timber, everything has disappeared: Secular oaks, groups of imposing beeches, tall birches, big maples, rooted saplings, staddles, moderns, ancients, superancients, young cadets, tall timber of young cuttings, reserves of middle age stature and old exploitations, everything was chopped down to within 20 inches of the ground, and dragged through copses of all ages to the roads by the pitiless cable actuated by a tractor. The copse is broken up, crushed, distorted, and destroyed.

"The forest of Imprechies, a section of the same commune, was cut to the ground, or almost; it was stocked with about the same growth as that of Monceau, though a little less rich in big trees.

"The commune of Beauwelz owned high timber on copse, less thickly planted than the Monceau forests. Of all the oaks, beeches, birches, and maples nothing is left over almost the whole area. The "Decauville" railroad, constructed for the transportation of the resinous timber of the private forest, seems to have helped to consummate the ruin of the forest; the trees were felled there in the copses of all ages, from six to eighteen years! The birches and other timber that could be used in manufacturing wooden shoes and for which the industry was paying at the time at the rate of 70 francs per actual cubic meter, were cut down at the same time as the oaks, being cut up into logs for use in heating the fire boxes of the tractors and locomotives.

ALL THAT IS LEFT OF A BELGIAN WOOD OCCUPIED BY BRITISH TROOPS WHEN THIS PHOTOGRAPH WAS TAKEN AFTER THE ARMISTICE. IT IS THE BOIS TRIANGULAIRE, NEAR MERCKEN. ALL THE SKELETON TREES STANDING ARE DEAD. THE YOUNG GROWTH IS UTTERLY DESTROYED.

"The Germans have ruined the commune of Beauwelz, and the indemnities the latter may be able to collect will not restore to it its forest wealth, which has hitherto been the uninterrupted source of its revenues, of wages for its woodsmen, and of raw materials for its makers of wooden shoes, all of which are factors of exchange and benefit to the whole locality.

"These two communes have been hit harder than the others. Beauwelz was able some twenty years ago to escape inroads on its timber supply such as had been

CONDITION OF A WOODLAND NEAR MERCKEN, BELGIUM, SHOWING HOW THE DESTRUCTION OF TIMBER AND DAMAGE BY HEAVY SHELLFIRE HAS TURNED FINE WOODLAND NEAR A WATERWAY INTO A SWAMP.

ANOTHER VIEW OF WOODLAND DESTRUCTION NEAR MERCKEN, BELGIUM. NOTE THE SHATTERED TIMBER LYING IN AND NEAR THE SHELL HOLES. RESTORATION OF LAND AS BADLY DAMAGED AS THIS IS WILL BE A TEDIOUS AND COSTLY WORK.

THE BOIS CHARPENTIER NEAR BISCHOOTE, IN BELGIUM, IS A SCENE OF UTTER DESOLATION. THE FOREST VALUE OF THE LAND HAS GONE AND IT IS A WATER-SOAKED, MUD-COVERED AREA MARKED BY NUMEROUS SHELL HOLES.

caused elsewhere by the assessment of the "usage duties" of the old principality of Chimay; as a matter of fact, it bought all the trees which were to be sold for the benefit of the Prince of Chimay. The commune of Monceau-Imbrechies was also reputed to have considerable savings. The Germans knew the smallest details of our affairs and we should not be at all surprised if they were aware of the financial situation of these two communes; they, who were fighting for justice (?), could it have been that they wanted their operations to bring about equilibrium in the forest wealth of our communes of Thierarche?" These reports do not cover the whole area of destroyed forests, facts about which are now being gathered and which will later be printed. A brief examination, however, of any of the destroyed forests indicates very clearly the truthfulness of the Belgian comment in summing up their losses: "Such is the work of the Germans, of professionals, for it appears that it was professional foresters who were charged with designing and directing these henceforth famous exploitations."

A SCENE IN THE BOIS DES LUPINS NEAR BOESINGHE, SHOWING THE GERMAN FORTIFICATIONS AND THE DESTRUCTION DONE TO TREES AND FORTIFICATIONS BY SHELL FIRE.

THE NORTHWEST'S WORST FOREST FIRES

AS this issue of American Forestry goes to press, the reports regarding the forest fires now raging in the Northwest show a situation of extreme gravity. The conditions are probably the worst ever faced in that region. The third and worst of three successive years of severe drouth has parched the country. High winds, heat, and electric storms, bringing lightning without rain, have heightened the peril. There are probably more fires burning uncontrolled at the moment of writing than have ever been known since organized protection of the forests began. Twenty-five hundred men are on the fire lines in the National Forests, and the entire available surplus of labor in Northern Idaho and Western Montana has been gathered up by the Forest Service, and is not enough.

The worst fire year of recorded history, from the standpoint of losses, in the same region was that of 1910. The great conflagration of that year began after the middle of August. Normally, conditions grow worse and worse until early September brings the beginning of the fall rains.

What may come this year no man can tell. If an appalling disaster is escaped, it will be due in part to good fortune. At the best, there will be very heavy losses of property. The situation may any day reach a point at which the organized forces which are trying to hold the fires in check will be routed and put to flight before a vast and resistless, hurricane-driven sheet of flame. The Forest Service admits that already, though straining every nerve, it is having to give ground before some of the fires, seeking not their control but merely to limit, in so far as possible, their destructiveness by directing their course where they will do least harm.

To know accurately what is taking place in a battle is proverbially difficult until the smoke clears away. With great forest fires a similar situation is created. It is unfortunate, but inevitable, that just now when spectacular losses are again directing public attention to the great need of better protection against these fires, it is impossible to make out fully why the efforts to control them have not been more successful. That can only be told when all the details can be studied and analyzed. Nevertheless, certain undeniable facts stand out.

In 1910 the same region was swept by fires so widespread and devastating that it was hoped their record would stand unique for all time. The Forest Service met the situation heroically. Confronted with conditions the like of which it had never faced before, it won universal commendation for the fight which it put up against great odds. In the light of the experience then gained it developed new methods and improved its organization. It also sought from Congress larger authority to incur expenses in future emergencies of the same nature.

The next year Congress provided an extraordinary emergency fund of $1,000,000. As the immediately following years happened to be exceptionally favorable this fund was cut, over the protest of the Forest Service, to $200,000 for the fiscal years 1913 and 1914, and to $100,000 for 1915, after which it was eliminated entirely.

Again and again the Forest Service has been embarrassed by delays in the enactment of the agricultural appropriation act until after the beginning of the fiscal year on July 1. In 1912 the bill became law August 10; in 1916, August 11; in 1918, October 1. In each of these years a "continuing resolution" made available in the interim at the rate of one-twelfth the previous year's appropriation each month. Since the heaviest expenditures of the Forest Service and the fire season fall in the summer months, the method is obviously inadequate. Through what shifts and devices the fire fighters have been employed, transported, equipped and fed this year because of delay can only be surmised, but very serious responsibilities must have been assumed and formidable embarrassments surmounted. The remedy is simple. Let Congress re-enact the million-dollar extraordinary emergency provision and make the fund available until the next year's appropriations can be drawn on. What is not needed will not be spent, but will revert to the Treasury. Public opinion should demand that this appropriation be made.

It is also plain that the fund for co-operation with the States in forest fire protection should be largely augmented. The total is now $100,000, apportioned among 24 States. Montana's allotment from this fund for the current year is $3,000 and Idaho's $4,500. The figures speak for themselves.

Further, it is imperative that radical measures be adopted to provide adequate salaries for Forest officers commensurate with the character of their responsibilities and with what private business enterprises are glad to pay the same men. The Forest Service is being starved out. Many men have left because they could not stand the economic pressure. In consequence green men have had to be put in where experience was of great importance. Repeated efforts of the Forester to secure more adequate pay for his field force have been without avail.

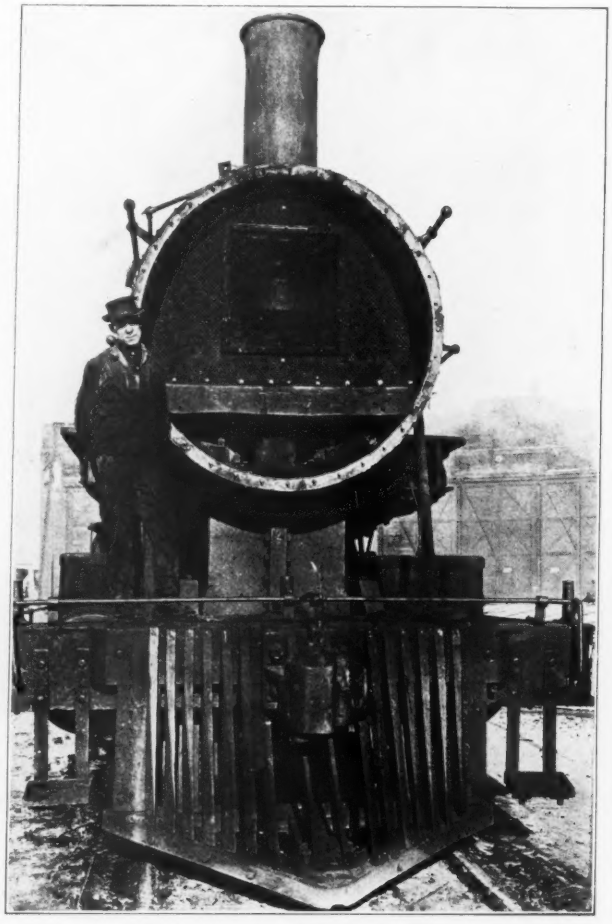
Finally, a more vigorous and determined public demand that forest fires throughout the country must be done away with, as nearly as this is humanly possible, must arise and find effective expression. Forest fires have become an anachronism. They belong to a heedless and unenlightened age in the matter of forest conservation. They must be fought on a nation-wide scale by private owners, the States and the Federal Government in co-operation. Protection of forests, including young growth, against fires must be made compulsory in all forest regions. Efficient methods must be developed under public leadership. Competent men must be employed by the States and the nation, and politics must not be allowed to make their work ineffective. The time for indifference and neglect is past. If our lawmakers fail to recognize the fact they may have cause to regret it.

PREVENTION OF FOREST FIRE LOSSES

BY SMITH RILEY

IT is well known the world over that America of all nations is careless with fire and although her equipment for suppression is of the finest, our yearly losses from fire are enormous when compared with other nations. The explanation of this would seem to be a lack of thoroughness in adopting and practicing methods of fire prevention. Does this failure come from the typical American haste in doing all things? Is it that in our construction work we are in such haste to arrive at completion we cannot take proper precautions to prevent loss from fire? Or is it that the ease with which property is gained and insured makes one careless whether it is destroyed by fire or some other way?

It is interesting to follow this line of thought in relation to forest fires doing enormous damage each year. These fires are from two causes, namely: Those started by man, and those started by lightning. A campaign of prevention should lessen and gradually eliminate a large part of loss from the first cause, while a policy of suppression must be applied to lightning caused fires. Lack of realization of the damage created by fire is certainly responsible for the greatest loss by man-made fires and it is quite interesting to note the gradual decrease in forest loss in those regions where progress has been made in educating the public to the necessity of care with fire to prevent such loss. The most effective way of doing this seems to be the forcible bringing home of the realization, by drastic measures, of the losses by fire and the need for cautious use of this element.



AN EFFECTIVE MEASURE OF FIRE PREVENTION

This is a form of spark arrester which has been employed with good effect on locomotives in Colorado.

In New York State the action of the Conservation Commission in forcing the railroads to burn oil in engines running over all forest roads during the fire season has been a big step towards public realization of the necessity for fire prevention. In South Dakota the most has been accomplished by a suit against a railroad that caused a big loss by forest fire.

Where the campaign for prevention has followed the principle of emphasizing the necessity of extreme care in any use of fire and the damage resulting to all forms of forest growth by its promiscuous use, much greater progress has been made towards a realization of need for public care in its use. In Minnesota recognition is given to the policy of spring burning of logging slashes, which amounts to nothing more than setting out fire in such areas as soon as it will run in the spring and letting it burn. From a vantage point in the forested region one may count a dozen or more such fires when the season is on. There is no question that this promiscuous use of fire does much to deaden the realization of the damage done by fires and the public realization of the necessity of caution in fire use or the need of prompt action to stamp out fires gaining headway in dangerous seasons of the year. A public, understanding that fires are purposely set which destroy forest growth, is not going to be very keen in responding to a policy for putting out fires that may be burning this same type of forest growth. I feel sure the present losses and the lax attitude of the public toward this loss will continue in Minnesota wherever the present policy of spring burning is allowed to continue in a wholesale way.

There is, therefore, a much keener realization of need for caution where fire is not promiscuously used and I feel sure that the problems of protection against fire loss will grow less and be solved with much greater promptness where the burning over of forest land is considered detrimental to the highest degree unless

AND THIS DESTRUCTION MIGHT HAVE BEEN AVOIDED

This shows one of the many fires in the Black Hills Forest of South Dakota started by locomotive sparks before the employment of oil burning engines on all lines running through the forest.

complete control is demonstrated as necessary and put into effect when such burning is done.

While much remains to be done, what has so far been accomplished in gaining public recognition of the proper weight to be given fire losses is very gratifying. Railroad companies are realizing the necessity of placing a value upon all trees from the largest to the smallest. A fire was recently reported near a railroad right of way. The railroad company's claim agents were sent to the area at once with instructions to ascertain whether the company was responsible for the fire, and, if so, to appraise the damage and offer to settle. In a recent juvenile court case, two boys convicted of leaving a camp fire burning were sentenced by the judge to take a two weeks' trip into the forest to study a burned area and report fully to the judge the damage done.

The public when brought to a proper realization of the losses caused by fires and the need of care and prompt action for fire prevention and suppression, may become a fighting machine of the most effective kind. A fire starts; the individual who first sees it thereby acquires the responsibility of putting it out and, if this is not possible, of securing assistance promptly. Everything should be learned about the origin of the fire which is possible, so its cause may be fully understood. The man first upon the ground is in the best position to gain available information.

There is attractive excitement in answering the call to fight fire. A man who has answered this call once will always feel a quickening of the pulse and a desire to act when the call comes again. The need for quick action regardless of the hour, the necessity of matching one's wits against existing difficulties to secure immediate action to control the element that is steadily destroying values it has taken years to create, brings a quickening of the pulse somewhat akin to that caused by a call for war. There is a big fire in one of the forests and an extra supply of equipment is needed. A wire has been sent to the district office for these things. The wire is received at 10.30 P. M. The next train upon which these things can be shipped leaves at 2.30 A. M. The first thing is to secure a conveyance and assistance, get into the supply room, pack the needed supplies, rush them to the station and express them out. Here is a piece of work that has in it only keen zest for matching one's wits against obstacles and not fail to fulfill the work of fire fighting for which one has been made responsible by the receipt of the telegram. A man who has been a ranger for

CATCHING IT IN GOOD TIME

This shows Mexican section hands putting out a fire started by a railroad engine crossing the Pike National Forest.

many years said the one thing he regretted in leaving his position was losing the exhilarating excitement of going to and participating in controlling forest fires.

Efficient organization is important because every man who answers to the call for fire fighting, and is well treated, that is, well transported, well fed and bedded, will respond with zest to the work. Even a lazy man will feel a quickening of the pulse when he hears the call, like the dog and the child in the street when the fire engine goes dashing by. Prompt pay and good treatment are important factors that will in time make every man within striking distance a fire fighter to be depended upon. Here is a garage in a small mountain town crowded with people in summer. Many men are employed in this garage when the season is on and a line of cars is run, by the company owning it, through the forest to the nearest railroad point. The administration is charged with the work of keeping fires out of the timber and the beauty of the forest growth along this road is of high value to the transportation company, so an agreement is entered into between the transportation company and the forest administration providing that the drivers of all cars upon the road will keep their eyes open and report any fires noticed. When the report of an existing fire is received at the garage, fire tools furnished by the Government are loaded into a car and a number of men working in the garage are whirled away to the fire. The company is paid for the time of its men and cars. One who has seen the faces of these men on the road when they have been suddenly taken away from the mechanical work of the garage and speeded into the open to fight fire, will understand the thrill of it. Efficient treatment must follow, else the men who respond will lose the zest of it. When the National Forests were first created there was no provision for

BURNED OVER AREA—THE ECHO RIVER FIRE

A public understanding that fires are purposely set which destroy forest growth is not going to be very keen in responding to appeals for fire protective measures and necessary control work, and must be educated to it.

HARD-WON REST FOR THE CREW

This shows the fighters at the Camp Creek Fire on day "sleep shift" near the burning fire line. Utterly exhausted, they roll up in their blankets and "tear it off."

paying except by check from Washington and those working upon a fire would have to wait a month or six weeks for their pay. It was not uncommon in those days, in calling a man to fight fire, to be told he would not go because it took too long to receive the pay. Here is different example: A bank cashier staying with some friends in the mountains, was asked by the forest ranger to help with a fire. He did so and worked at it all day. The check he received for his work was to him a souvenir of a novel and exciting experience. In the future, should this man be in reach of a forest fire alarm and be available, he will respond just for the excitement of it.

WHEN THE GHOST WALKED

Here we see the forest officers paying off fire fighters at the termination of the work.

I have been told one loses his enthusiasm after fighting fire for a day or so; that the forest rangers in sections where the fire seasons are long and intense, become so wearied they dread to answer the telephone for fear the message may be of a fire requiring mammoth exertion. It is true that when the body is weary, enthusiasm lags, but where the seed has been effectively planted, a period of rest will work a complete change as one's enthusiasm comes again to the front. Those rangers at the beginning of the fire season are keen and enthusiastic. When they become weary by overexertion, give them a rest of a week or so and see what a change for the better will take place. This element of thrill is a real factor; it pays well to cultivate it in all classes of men. The response will come from those who delight in action and the attraction will be the zest of matching one's energies against an element of destruction beyond control. Efficiency in management, such as good and prompt pay, transportation, good food and bedding, leaves the way clear to develop this enthusiasm, whereas poor management in any one of these things would tend to obstruct or lessen this enthusiasm.

FOR THE COMFORT OF THE INNER MAN

This shows the thorough and methodical arrangement of the kitchen and commissary established near the fire line for the service of the men who are fighting the fire.

FOREST DESTRUCTION PREVENTED BY CONTROL OF SURFACE FIRES

BY JOSEPH A. KITTS

FOREST fires in the United States destroy, year by year, more than the forest yield. It requires at least 250 years for a forest to reproduce itself, *i. e.*, the yield is not greater than two-fifths of one per cent per annum. The stand of timber is being cut at the rate of 3½ per cent per annum. It is evident that we must save the yield and augment natural reproduction by planting, in order to insure a future supply. The situation is now so critical that the fire problem is one to which earnest thought and attention should be given until a solution has been proven, accepted and put into practice throughout the United States.

Forest fires are of three types in effect—surface fires which spread over the surface of the forest floor, fed by the litter; ground fires which smolder in the ground, consuming the humus and sometimes the roots of trees; and crown fires which destroy the entire forest cover. Crown fires start from the ground and the litter must be very heavy and very dry and inflammable to cause and sustain them. The humus must be very dry to sustain a ground fire.

I have practiced for the past twenty-eight years, on my home lands in California, a method of prevention of crown fires learned from the Sierra Nevada Indians. I have found this method successful in my second growth timber and also in prime forest where the accumulation of litter (the cause of destructive fires) was in considerable proportion. This method has been highly satisfactory from every point of view and is here offered as a solution of the fire problem in the coniferous forests.

The method consists in the burning of the forest litter, by surface fire control as described herein, during and at the end of the wet season, burning over by rotation from one-fiftieth to one-fifth of the forest area each year, the periodical rotation depending upon the local rate of litter accumulation. The litter is then burned without danger from crown or ground fires and, if handled scientifically, aids natural reproduction, removes the excess underbrush, increases the forage, maintains the forest in a thrifty and healthy condition and renders the forest immune to destruction by fire at all seasons of the year.

It is well known that the Indians practiced a periodic burning over of the forests. Literature on the subject has explained this in many ways excepting the one here given. When the California pioneer asked the Indian why he set so many fires, he replied, "Letum go too long—get too hot—killum all." He used the surface fire to burn the litter in order to prevent the crown fire which destroyed everything. He may not have been very scientific but it must be admitted that his methods of preservation of the forests were highly successful when compared with present day destruction. The first growth trees are fire-marked throughout the northern Sierra Nevada forests; the indications of destruction by crown fires prior to the coming of the "Americans" are in small proportion and so indistinct as to point to fires very remotely in the past, if at all; and, the ages of the prime trees precludes the occurrence of crown fires for hundreds and thousands of years of aboriginal treatment. The pioneers found these forests open and clean; today they are so encumbered with fallen trees, underbrush and other litter that complete destruction is the usual result of a summer fire.

Consider the fires in the Crater Lake National Forest in 1910. (Forest Service—Bulletin 100). This forest has an area of 1,166,600 acres, an estimated total stand of 10,197,000,000 feet B. M. and a rated annual yield of 90,000,000 feet B. M. 60,891 acres, or 1-19 of the total area, was burned over, destroying 250,000,000 feet B. M., or 1-40 of the stand of timber. One thousand men, employed in fighting the fires, were found inadequate and five companies of United States troops were added. The cost of fire fighting to the Forest Service was $40,000, or 70 cents per acre for the area destroyed. One thousand acres of the burned-over area was reseeded at a cost of $3.00 per acre. The loss, then, cannot be estimated at less than $3.70 per acre. The timber destroyed was three times the annual growth, and, although the year 1910 was an unusually dry one, it must be remembered that the average annual destruction, throughout the United States, is greater than the rate of growth.

I recently had an opportunity to study the densely planted forests of France. It should be observed here that without these planted forests France could not have waged war for four years. Crown fires are unknown in these dense forests because the people gather the litter for fuel. It is not possible, of course, for us to go fagoting through our forests and we must dispose of the litter in some other manner.

We use the backfire to remove the litter in order to stop a crown fire, and under most adverse circumstances. When the crown fire reaches the area backfired the live trees alone will not sustain it and it is stopped. Even in the drouth of summer, the backfire does little or no harm to the live trees. When the backfire is used to stop a crown fire, it only limits the destruction; it may be used in the spring to prevent it. The backfire is a controlled surface fire working against the wind, which prevents it from becoming a crown fire.

The following rules for surface fire control may be safely used by any engineer or forester experienced in forest fire fighting:

1. Burn the forest litter, by means of surface fires, during and at the end of the wet season, in intervals of

(*Continued on Page* 1306)

UNCLE SAM, LUMBERMAN, CANAL ZONE

BY W. H. BABBITT

I DO not believe that it is very generally known that the United States Government is in the lumber business, actually operates a saw-mill, maintains lumber yards, sales department and all of the other establishments that go with the business. This is, nevertheless, a fact. The operation is on the Panama Canal Zone. The radical departure from the general policy of the Government is, I believe, likely to be of interest to American timbermen, and as the operations are being carried on in a new or little known field, the results obtained should also be of much interest. I hope my effort to impart these facts may not be too severely dealt with, if I also attempt to sketch in a little of the local color and a few of the human heart throbs, to lighten the otherwise heavy duty of the self-appointed historian.

The business is a child of the war and was brought into being to supplant, as far as possible, by use of native species, lumber imported from the States, and thereby release shipping for war purposes. One may wonder, if not conversant with the facts, why, when the canal is dug and duly operating, any great shipments of lumber were required. One look at the machine shops, dry docks, foundries, etc., necessary to the maintenance of locks, dredges, liters and tugs of the operative departments of the canal where ships are repaired, or even built complete, or at the extensive car shops, where the rolling stock for the Alaskan railroads is being made up from old canal equipment, together with orders for foreign service and for the States, should be sufficient to convince one that raw material in quantity is, and will be, constantly required.

SHOWING DETAIL OF THE PECULIAR BARK OF THE LIGNUM VITÆ

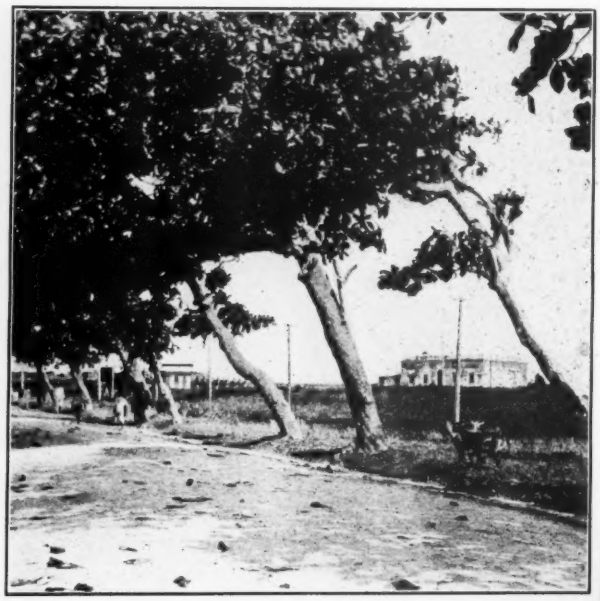
The wood is close-grained, heavy and very hard, and the tree, with its richly colored dark green leaves, its blue flowers and orange-red fruits, is in striking contrast to its arid surroundings.

Many millions of feet of lumber had to be cut to entirely supplant the shipments from the States. Could it be done? Well possibly, yes. There was machinery and men enough, but what about the timber? When garnered together from near and far, the facts were by no means imposing. It was known that the local forest contained trees that could be cut into sawlogs. Some of these trees had even been sawed up on a little resaw rig prior to the birth of the new industry and furniture woods such as coco bolo, nazareno, mahogany and Spanish cedar of the cigar box variety, had been logged from the Zone since the old French days, and there it ended, for while sawmills are plentiful on both coasts of Central America, none of them have ever cut commercial lumber, nor been successful in selling what they have cut, and from the point of view of a practical lumberman, the field was, and is, an entirely new one.

The mill itself is not too imposing, a thirty-five foot band saw intended originally for resaw work in ship construction, on which the edging is also done, and a trimming and slab saw. The entire rig occupies a corner of the large planing shop, but it is gradually, like the camel of the fable, pushing the original machinery out into the open. Roll ways were built to receive the logs, since most of the timber was expected to be of floating hardwoods and a pond would not only be nearly useless, but would unduly excite the sanitary contingent, a power to be reckoned with on the Zone. Please note that the first lesson to be learned by a newcomer, upon landing in the Isthmus, is to let sleeping dogs lie, for be it known that the ways of our Uncle Samuel are passing strange to the uninitiated.

Dry kilns were also built and so was a burner to take care of the slabs. A logging camp was established on Gatun Lake and those in charge of it had the double duty

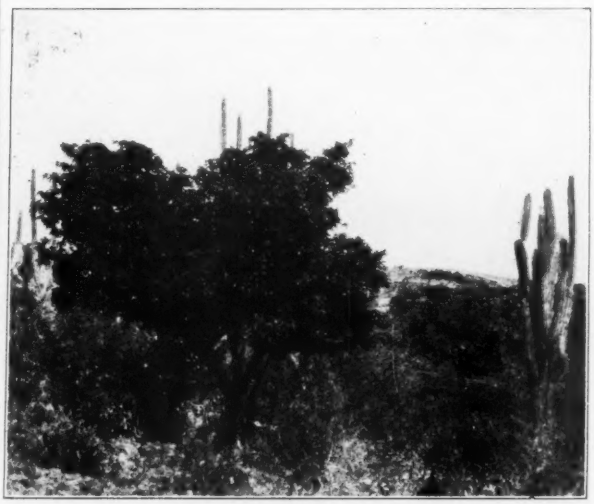
of choosing the species to be cut from an endless variety of entirely unknown trees and of inducing the natives to contract for the cutting of the same, that having been found the most satisfactory way of handling the labor question in the tropics. Gatun Lake, along the shores of which the logging was to be done, is approximately twenty-five miles long by twelve in its greatest breadth and is a lake of a thousand arms and islands. It is an artificial body of water held by Gatun Dam eighty-five feet above the salt water level. It is a reservoir for lockage water and for hydro-electric power and is one link of the canal proper, frequently giving the woodsman the rather unusual spectacle of one of the world's largest ships quietly slipping along through the tall uncut forest.



AN AVENUE OF WEST INDIAN ALMOND TREES

The standing forest in the lake bed was only cleared from a few areas such as the canal channel and the anchorage basins, and the rising water flooded valley, hill, forest and farm to a depth of up to fifty feet, so that the lake is standing full of the skeletons of the former forest, or, what is worse to the logger, the snags of the trees that have rotted off at the water's edge and fallen, for these snags just below the water are as hard or a little harder than they were when green. The loggers' job was to cut these trees, often nearly as hard as iron and as heavy, roll them into the lake, float them through the snags and trees and load them on the cars at the railway. That we are getting the timber at all speaks well of the bush man, who is far from the indolent person he seems at first sight and is more the victim of conditions and lack of training, than a willing idler. He is doing the heaviest work regardless of the tropical discomforts of fever, insects, heat and rain. He has not the slightest knowledge of the American woodsman's tool, the machete, or brush knife, replacing with him all of the other implements of either husbandry or logging; and it is only possible to induce him to give it up after a long season of education, but these men know the ways of the bush and will in time, learning the use of proper tools, become valuable workmen.

Many were to be the surprises and the mortifications of the cruiser who selected the timber to be cut. It was not enough that he must witness the weird freaks often indulged in by some innocent looking tree of apparently decent habits and good timber form, but the result of his judgment came in for most rigid inspection. Criticism seemed to be free to every one and he was generally held personally responsible for the behavior of his selections. A typical failure in choosing a species was that scored by the espavay, from which tree the natives have hued their canoes since time began. It grows to a large size, is common everywhere, floats and seemed likely to be just what was wanted for a rough building material. Indeed, it had been, so rumor said, successfully sawed in various faraway places. The first difficulty was encountered when the saw struck the log. One side cut all right, but the other was like rope, such a bunch of fuzz I never thought could come out of a tree. The sapwood on a large log would be a foot through, white or yellow, with a woven winding grain; the heart was red, gritty, hard and so



LIGNUM VITÆ, OR GUAYACUM, IN ITS NATIVE SURROUNDINGS

brittle that a six by six would break from a three-foot drop. The sapwood was stronger, but was attacked by millions of boring beetles that would destroy a timber in a single night. To stop these ravages the lumber was put into the kiln the moment it left the saw and by this means was rendered immune to further attack, but under this treatment it took to winding, twisting and splitting beyond expression.

Experiment finally showed that this species, treated to live steam and then dried under a shed with plenty of ventilation, while it showed a tendency to decay, could yet be used where strength was not required. The use of

NOTE THE GROTESQUE SHAPES INTO WHICH THESE ALMOND TREES (ALMENDRA) HAVE BEEN BENT BY THE TROPICAL WINDS

this species has been discontinued, the cost of saving it being disproportionate to the results obtained.

Other trees were tried, some of their lumber would split open in the sun and continue the process down to near the excelsior stage. Others that when fresh from the saw, seemed strong, serviceable lumber, yet dried up to be as soft as cork, or became as brittle as chalk. Some had poison sap, some decayed within a few weeks, and nearly all were attacked by borers and beetles.

Those first days were dark days indeed, but slowly one and another variety was found that stood all of the tests and proud indeed was the hour when lumber, actual lumber, fulfilling all requirements, began to pile up in the yard—lumber that one could trust alone over night without dire misgivings for the morrow.

Three soft wood species have proven their value, but these, while very beautiful and useful, are not in sufficient stand to be of commercial importance; indeed, it is difficult to secure all that we need for our own uses, but the hard wood is a very different story. We have large stands of this and they should be of the greatest importance to the trade.

Lignum Vitæ, generally well known, is plentiful and has been supplied to the various navy yards, where it has given entire satisfaction. It is a very large tree and is unbelievably strong and is heavy as well, about seven pounds to the board foot. The natives bring it in slung under a dugout canoe in logs up to forty inches in diameter and fifty feet long.

Nispero, or bullet wood, is the local rubber tree and is the wood eternal. Timbers in the old Spanish forts along the coast are still sound after a century or so of exposure to the weather. This wood is springy as well as strong and splits well. What wonderful ties it would make, and this may be the eventual use of the timber, for the gum hunters in their rush for rubber have girdled every tree in the forest and all are dead or dying. These trees will, of course, stand for many years to come and may still be utilized.

Almendra is a larger tree even than the *Lignum Vitæ* and the most plentiful hardwood in the forest. It is unexcelled for fenders and heavy ship work requiring timber harder and stronger than oak. Some *Almendra* fenders were put on a heavy dredge between sections of white oak by way of a test, and within three months were reported as an absolute failure. This was a heavy blow to the somewhat friendless individual that stood sponsor for the species used and great indeed was his relief when examination proved that the *Almendra* stood without a mark while the white oak chafed to pieces. The crew, following the usual custom, jumped to the conclusion that the native species was no good. Indeed, I have found that the native substitute has to be far better than the timber it supplants in order to pass the willing and self-appointed critics. The climate is far from kind to any wood. Oak goes to pieces in about six months, sap pine in a few weeks, but the casual observer does not know this and judges native species with the behavior of lumber in the States. There are many other valuable woods of which we are learning slowly. Some day, perhaps, the sum of our knowledge will enable private capital to unlock some of the vast storehouses of the interior (Government operations will doubtless be confined to the Canal Zone). Heretofore the maze of worthless timber and lack of definite knowledge as to what really was merchantable has effectually barred the good timber from a long ready market.

FOR THEM A TREE STANDS THERE

GEORGES CUVIER was born in 1769—one hundred and fifty years ago. This pupil of Linnaeus is rated one of the greatest naturalists the world has ever seen. Perhaps only to the elect is the name Cuvier known, but people are noting the century and a half since he was born, so great has been the interest awakened in the planting of things. The planting of Memorial Trees easily takes the lead in this revival. In the planting of the living, growing tree the people of this country are erecting their own memorials not only to those who gave their lives to their country but to those who offered their lives. The planting takes many forms and is not confined to remembering war heroes. Just the other day the Whitman Park Improvement Association planted a tree in honor of Walt Whitman to mark the hundredth anniversary of the poet's birth. In many schools and colleges, graduating and incoming classes are planting Memorial Trees to come back to at future reunions. One of the most far-reaching forms of co-operation with the American Forestry Association is the call to the Christian Endeavor Societies of the World to plant Memorial Trees. This call has been sent out by the Rev. Francis E. Clark.

All Memorial Tree planting should be reported to the American Forestry Association at once, so it may keep its honor roll of such planting complete.

Following the suggestion made by the American Forestry Association that Memorial Trees be planted in honor of Jane A. Delano, of the Red Cross, the first tree reported placed in her memory was at Canton, Pennsylvania, her home, by the Village Improvement Association. Thirteen trees were planted on the playground maintained by that organization. One of these was planted in memory of Sidney R. Drew, the son of the actor, whose home was at Canton. Twelve trees were planted in a circle and the tree for Miss Delano was placed in the center. The exercises were opened with the singing of "America" and Mrs. Emmeline Leavitt, the oldest member of the Daughters of the American Revolution in the state of Pennsylvania, said the prayer. Mrs. Frederick W. Taylor, the president of the Association, gave the address. Mrs. L. M. Marble, of the Canton Red Cross, a neighbor of Miss Delano, told of the Red Cross worker's love of the hills about Canton and how she had expressed a hope to return to them as soon as the war work was ended. Mrs. Charles H. Derrah was in charge of the exercises. The Canton honor roll will appear in an early number of this magazine.

Another impressive ceremony was the dedication of the "Patriot's Grove," near Philadelphia, by the National Farm School. Here trees have been planted in honor of those who gave their lives to their country and in honor of those who offered their lives. A flag pole was dedicated to the memory of Henry F. Singer at the same time. In the list of speakers at this ceremony were Judge John M. Patterson, Edward Bok, John H. Mason, Joseph Pennell, Harry W. Ettelson, Franklin Spencer Edmonds. Though not as large, of course, this grove is along the same idea as that one planted at the United States Army Balloon School at Ft. Omaha and Ft. Crook. At these places Col. Jacob W. S. Wuest has directed the planting of five thousand trees in memory of those who died and in memory of those who served from that camp of instruction. Two of these trees are for Red Cross workers who died at the camp. These trees are being marked by the next of kin with the bronze markers designed by the American Forestry Association. This list will appear on the honor roll in a forthcoming number of the American Forestry Magazine, as will that of the National Farm School. A "Hero Grove" has been dedicated in Golden Gate Park, in San Francisco. At this dedication one of the most remarkable demonstrations was seen. Daughters of the Golden West laid Wreaths of Remembrance on an obelisk in the park. These wreaths came from hundreds of towns and cities in California. The citizens joined in the biggest Community Sing the city had ever heard. A great community spirit is being born out of Memorial Tree planting. Coloradoans in San Diego are making plans to plant a Memorial Grove at Camp Kearny. Miss Isabella Churchill, the secretary of the Quadrangle Committee, 2170 Fourth Street, San Diego, has sent out a call to all Colorado people to help in marking the spot where the camp is maintained, for it was through this camp many boys from that state passed.

Another example of community work is the building of a Memorial Park at Reading, Massachusetts, in one day. Everything was planned weeks in advance and everyone had a place in the all day work. A wilderness was turned into a beauty spot and the honor roll from Reading will appear in American Forestry shortly. At Lynchburg, Virginia, Honor Oaks have been planted at a ceremony attended by a tremendous crowd. E. F. Sheffey, president of the board of aldermen, presided. Rev. Joseph B. Dunn and Dr. James D. Paxton took part in the ceremony, which was conducted by J. T. Yates, J. C. Woodson, and G. H. Read, of the Park Department, and a committee from the Woman's Club, of which Mrs James R. Kyle was chairman. In Cincinnati, pupils of the Avondale School planted Memorial Trees and at the ceremony Leona G. Van Ness, of the third grade, dedicated the trees. Miss Annie L. Kinsella informs the Association that the little girl based her talk upon suggestions she found in three copies of American Forestry. Another school to plant Memorial Trees is the Municipal University of Akron, Ohio. The planting of Memorial Trees by the graduating class of Georgetown University, when fifty-four trees were placed in honor of her sons who gave their lives in the war, is the most extensive planting by a college thus far reported to the Association. The trees, Lombardy poplars, typical of France, were planted in "The Walks," which is surrounded by a natural amphitheater of sloping, wooded hills. The trees

LIVING MEMORIALS FOR THOSE WHO DIED

On left—Planting of Victory Oaks at Lynchburg, Virginia.

On right—Leona G. Van Ness planting Victory Oak at Cincinnati.

Below—Dedicating "Grove of Heroes" in Golden Gate Park, San Francisco.

are marked with the bronze marker designed by the Association. Dr. Ernest LaPlace, of Philadelphia, delivered the oration dedicating the trees.

Making our motor highways "Roads of Remembrance" is a suggestion of the American Forestry Association that has been taken up throughout the country. The suggestion was made coincident with the start of the Motor Transport Corps' transcontinental run from Washington to San Francisco. Newton D. Baker, the Secretary of War, dedicated the Zero Milestone from which the truck train started. The Association urges planting of Memorial Trees, Memorial Parks and Memorial Groves with the routes of the motor highways in mind. Indeed, the erection of any form of Memorial should keep the routes in mind, the final result being one vast chain of Memorial Drives that will make the country easy to see and at the same time the most famous touring country in the world. With France as an object lesson and the United States facing a road building era involving the expenditure of half a billion dollars, there is a fine opportunity to do something big in an educational way for forestry by having the people, by county units, beautify these roadways. The beauties of French roads are widely known. A Roads of Remembrance campaign has been taken up in Great Britain. In France road building is going forward that will connect the cemeteries and the famous battlefields. We in this country do not have these battlefields and cemeteries to connect, but in connection with the erection of memorials of one kind and another, why cannot a definite plan be worked out whereby the memorial can be placed within easy access of the motor highways? Then, with the proper planting of Memorial Trees having been done in the meantime, we will have a countrywide memorial which will be worth while and a fitting tribute to the men who answered their country's call.

NATIONAL HONOR ROLL, MEMORIAL TREES

Trees have been planted for the following and registered with the American Forestry Association, which desires to register each Memorial Tree planted in the United States. A certificate of registration will be sent to each person, corporation, club or community reporting the planting of a Memorial Tree.

WASHINGTON, D. C.—By Georgetown University: John B. Ahearn, James C. Amy, Melvin M. Augenstein, Joseph Baumer, David L. Bawlf, J. A. Beck, Charles T. Buckley, Douglas G. Cameron, M. J. Carroll, Thomas C. Carver, John Cissel, Edmund J. Crowe, Walter P. Desmond, Dennis R. Dowd, Jr., Ralph E. Donnelly, Julian N. Dowell, James P. Dunn, Alexander P. Finnegan, Arnulf Gloetzner, James L. Goggins, August DeY. Green, Robert M. Hanford, Harold Hall, Maurice L. Harding, Warren G. Harries, Albert Holl, Charles W. House, Grandville Jones, Louis J. Joyce, John J. Keady, Joseph T. Keleher, William L. Kelly, James L. King, John Lyon, Ernest P. Magruder, John Mahlum, John W. Marino, John A. Martin, Joseph G. McDonald, William F. McNierney, William F. Miltenberger, T. J. Moran, Leo Malcolm Murphy, Frank Murray, Joseph A. Parrott, Edward S. Pou, Gilbert Sanchez, William A. Sheehan, Francis M. Tracy, A. G. Vanderlip, Julian Robert Worthington.

CANTON, PA.—By Village Improvement Association: Jane A. Delano, director general, nursing department, Red Cross; Leroy G. Clark, William Mandeville, Gordon B. King, Corp. Sidney R. Drew, Mack M. Jenkins, Ernest Williams, Sgt. Ray Myron Crandle, Paul Turner, J. Howard Wilcox, Howard Soper, Leon C. Wilcox, Corp. J. Harry Mason.

CHAMBERSBURG, PA.—By Falling Spring Presbyterian Church: Lieut. James G. Nixon.

CORAOPOLIS, PA.—By Coraopolis High School: John Arthur Holmes, Vance Hays, John Wesoloski, David Pugh.

DEVON, PA.—By Mrs. Emory McMichael: Lieut. William Bateman.

EAST STROUDSBURG, PA.—By White Oak Run School: J. L. Strockbecker.

MIDDLEBURGH, PA.—By Shambach and Wagenseller: Charles F. Mitchell.

PHILADELPHIA, PA.—By National Farm School: Louis Berkowitz, Jacob Bledenthal, Morrie A. Deutsch, Jerome L. Goldman, Lieut. Jesse Warren Guise, Simon C. Hellman, Joyce Kilmer, Roy Stewart Marlow, Dr. G. M. Neuberger, Sgt. Harry Polinsky, William C. Rees, Byron H. Reis, Capt. Eugene Rice, George Burton Rosenthal, Alexander J. Roth, Lester B. Rothschild, Mortimer Strauss Rubel, Henry F. Singer, Solomon Spicker, Milton Stern, Bernard W. Traitel, Eli Wittstein, Lieut. Ralph Anspack, Herman L. Artzt, Nelson H. Artzt, Justin S. Bamberger, Eli D. Bernheim, Harold B. Blumenthal, Albert Coons, Jerome Drucker, Isadore J. Faggen, Samuel Faggen, Leon Feigenbaum, Ensign Milton Stanley Getz, Herbert F. Goldstein, Jacob F. Goldstein, Ralph Gutlohn, Julian A. Hillman, Sgt. Isaac L. Hyman, Dr. Leopold Max Jacobs, Reuben Jacobs, Charles S. Kaufman, Corp. Walter Kaufman, Sgt. Manfred R. Krauskopf, August Manasses, Dr. Jacob L. Manasses, J. DeRoy Mark, Leonard George Needles, Isadore Oppenheimer, G. Sidney Reinheimer, Leon W. Reinheimer, Herbert D. Reis, Eli M. Rohrheimer, Sgt. Jerome H. Rose, Sgt. S. Ralph Schwarzschild, J. Leonard Sessler, Arthur Shoenberg, Arthur Silverberg, Edwin H. Silverman, Leonard Sostmann, Capt. Camille Stamm, Morris H. Starr, Arthur A. Strouse, Frank L. Teller, Ensign Jerome L. Teller, Philip H. Weinberg, Gustave L. Winelander, Stanley S. Wohl, Myron Albert Zacks.

VALLEY FORGE, PA.—By Daughters of the American Revolution: Lieut. Warren T. Kent.

HIGHTSTOWN, N. J.—By the High School: Harold Fones, Lewis Forman, Samuel Platt, Jr.

HOBOKEN, N. J.—By the High School: Frank LaPointe.

JERSEY CITY, N. J.—By Schools Nos. 1 and 16: Frank Braitsch, Louis Cohendet, Alexander Brady, Henry Johnson, George Devlin, Joseph Weinert; by School No. 4: Dr. Leonard M. Kalaher; School No. 5: Boys of Neighborhood; School No. 19: Michael Keaveny, Harry R. Holler, Louis Halperin, John J. Doris, Michael P. Smith, Thomas O. Dorward, Anthony Mafarra, James T. Barke, William H. Reuter; by School No. 21: Boys who had attended School No. 21; by School No. 30: Roy Losey; by School No. 32: Max Frank, Francis Dillon, Frank Sardoni, James Mason; by School No. 33: Roosevelt, Victory, Peace, Foch, Wilson, Pershing.

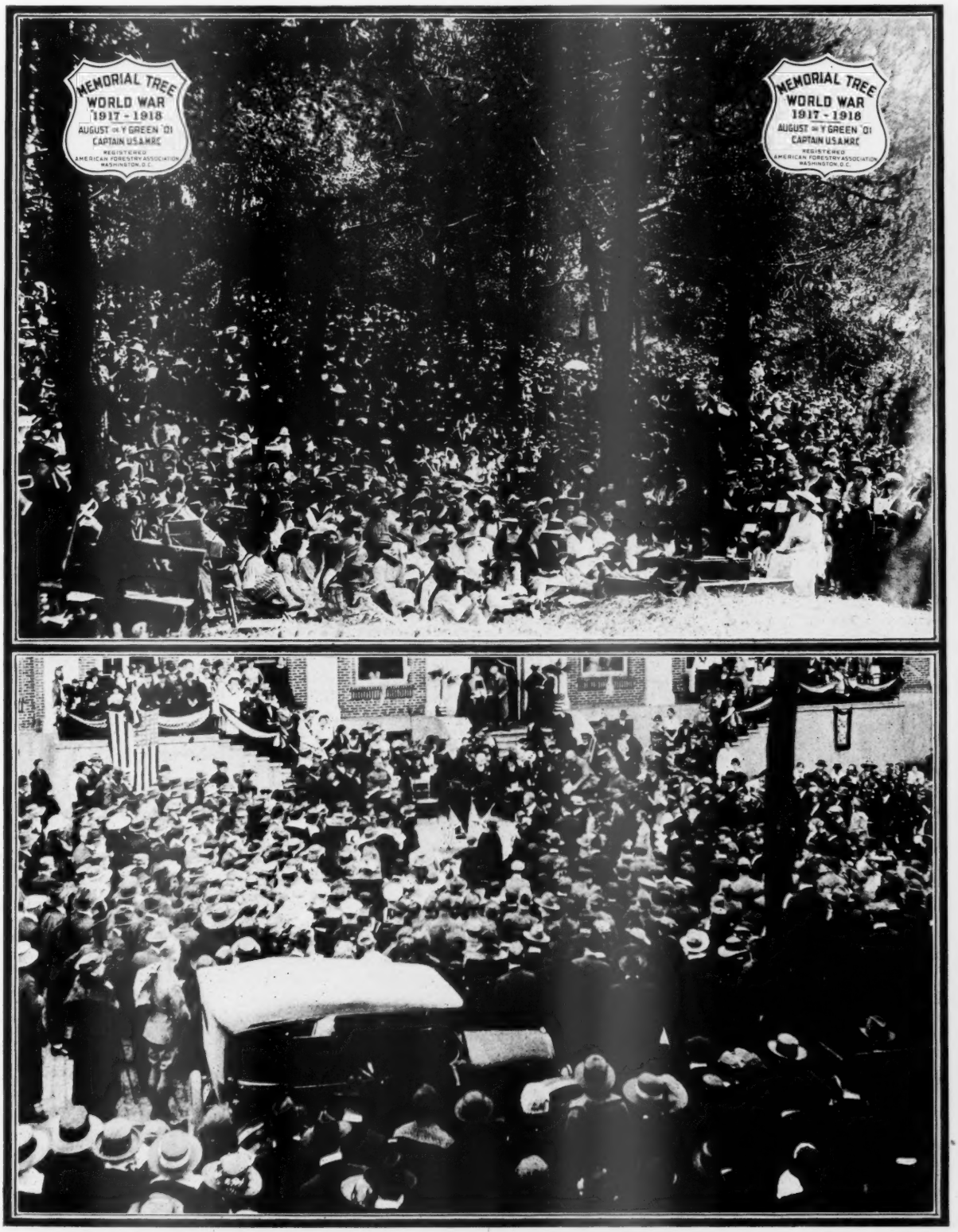
NEWARK, N. J.—By Memorial Tree Committee: Sgt. Irving C. Olstrum; by Boy Scouts of America: Theodore Roosevelt.

PARK RIDGE, N. J.—By Free Public Library: Edward B. Abrams, Charles F. Stalter, Fred H. Pysner, Martin F. Casteloni, Lester McGinnis.

PLAINFIELD, N. J.—By Watchung School: Holmes E. Marshall, Russell Hall, John H. Down, Benjamin H. Giles.

RAHWAY, N. J.—By Wilfred Smith: Lieut. Henry W. Cleary.

TREE PLANTING BRINGS OUT COMMUNITY SPIRIT



Upper—A community sing was one of the features of tree planting in San Francisco, and this picture shows what interest can be aroused when the "gods' first temples" are used.
Lower—Part of the throng at Lynchburg, Virginia, when memorial trees were planted.

RED BANK, N. J.—By the High School: Lieut. Herbert O. Tilton.

SOUTH ORANGE, N. J.—By St. Andrew's Church: John W. Weir.

TRENTON, N. J.—By Mrs. Elizabeth O. Hunter: Lieut. E. Oliphant.

WEST ORANGE, N. J.—By West Orange High School: James Sayers, Miles Suarez.

ASHVILLE, N. Y.—By members of Ashville Grange 694: H. Vincent Moore.

COLLINS CENTER, N. Y.—By the High School: Dr. Herbert W. Mackmer.

DOLGEVILLE, N. Y.—By Boy Scouts of America: Theodore Roosevelt.

MOUNT VERNON, N. Y.—By Westchester Woman's Club: William Wiley Hayward.

NEW YORK CITY—By Mrs. Regina Rubel: Lieut. Solomon Rubel.

OGDENSBURG, N. Y.—By St. John's Episcopal Church: Frank M. Hanbidge, George Ashwood, Frank S. Harper, Clarence Merris, Charles Holbrook, Clarence W. Streeter.

SYRACUSE, N. Y.—By St. Patrick's Church: Sgt. John J. Hogan, Raymond Koagel.

VALATIE, N. Y.—By Chatham Union School: Miss Catherine Smith, Soldiers and Sailors.

COLUMBIA, TENN.—By Business Women's Association: Lieut. Clarence H. Fry, Lieut. J. C. Wooton, Sgt. Joe B. Warren, Walter D. Goodwin, Clifford Earl Hutchinson, C. W. Hamilton, Jr., Corp. James W. Wilson, Horace Hickman, Melvin White, Eli Richard Haywood, William Rufus Crumley, Corp. Eugene W. Huckaby, Walker Fitzgerald, Tom Workman, Corp. Herbert L. Griffin, Lieut. Robert B. Gilbreath, John Thomas Richardson, Corp. Basil O. Blocker, Wilson D. Holman, Robert A. Hays, Capt. Meade Frierson, Jr., John Will Thompson, Rex Bernard Vestal, Osey Jones.

KNOXVILLE, TENN.—By Park City Presbyterian Church: Lieut. William Hugh Eckel, Dick Dickson.

NASHVILLE, TENN.—By Fall School: Guy R. Only, Raymond F. Houston, John W. Weber; by Tarbox School: Capt. Charles Duncan, Harold Goodwin, Marshall Goll, Emmet Manier, Carter Milan, Ed J. Walsh, Dan Wasserman, Walter S. Yarbrough.

GREEN BAY, WIS.—By Mrs. C. Richard Murphy: C. Richard Murphy; by Miss Jessie DeBoth: Lieut. E. R. DeBoth; by W. D. Fisk: Hiram Fisk, Arthur C. Neville, Sgt. William H. Livie; by P. H. Martin: Lieut. John Martin, Lieut. Jerome Martin, Joseph Martin; by Mrs. Margaret Parmentier: Capt. Jules M. Parmentier, Capt. Douglas Parmentier; by Mrs. Arthur McCarey: Major Arthur McCarey; by Mrs. M. E. McMillan: Myron McMillan; by Mrs. Frank H. Hoberg: Lieut. Leroy Hoberg; by Mrs. J. P. Lenfesty: James Nuss; by Mrs. Herbert MacPherson: Capt. Leland Joannes, Kenneth Hoeffel; by Mr. J. R. North: Reynolds North, Ludlow North; by Mrs. Mitchell Joannes: Lieut. Frederick Kendall; by Mrs. W. E. Collette: William Harold Collette; by Mrs. R. C. Buchanan: Frederick C. Parish, Edward Tyrakoski; by Mrs. Fred L. G. Straubel: Major Clarence Welse Straubel; by Kellogg Public Library: Patrons of the library; by Mrs. S. D. Hastings: Women's Committee of Brown County Council of Defense; by Mrs. A. C. Neville: the nurses of Brown County; by the Country Club: Lieut. Harry Howland Fisk, Lieut. Robert S. Cowles, John Parrish, George Van Laanan, John Vance Laanan, Capt. V. I. Minahan; by Junior High School: Lieut. Reginald Calkins.

AKRON, OHIO—By Students of the Municipal University: Thomas B. Welker, Thomas J. Quayle, John Laube, Lee W. Pitzer, Bernard Adler, Ray A. Bohl; by The Boy Scouts of the Goodrich Rubber Company.: 250 trees for Theodore Roosevelt.

CINCINNATI, OHIO—By West Fork School: Roman J. Heis, Henry W. Deucher; by Pleasant Ridge School: Lloyd McArthur, Earl L. Parrott; by Westwood School: John Henry Koenig, Dr. Clement Laws, Anthony Schwab, Jens Paterson, Edwin Harder; by Oakley School: Norman Le Roy; by Bond Hill School: Hanley Masters, Walter Volkert; by Carson School: John Rowan, Walter Sang; by Whittier School: Lovett Channel, Clifford Paddack, Wesley McKinney, Harold Van Matre; by Eighth Grade Civic Club: The Heroes, William Heiert, Our Fallen Heroes; by Seventh Grade Civic Club: Frank Wagner, Ralph Wagner.

ELMWOOD PLACE, OHIO—By Elmwood Place High School: Homer L. Gilbert, William H. Peters, Ralph D. Breckel.

TWINSBURG, OHIO—By Boy Scout Troop No. 1: Orland Bishop.

BAXTER SPRINGS, KAN.—By Baxter Springs Women's Club: Nathaniel Burns, Harry E. Davis, Albert McCoy, Frank Morford, Frederick Young, Leonard Armstrong, Clarence McCullough, Albert Schroeder, Grover C. Taylor, Francis Roland Romack, Clinton West, Harry G. Smith.

LAWRENCE, KAN.—By Lawrence Public Schools: Mark Beach, Albert Ellis Birch, Max Brown, John Wilfred Charlton, Charles Luther Cone, Everett Demerritt, Eli Ferril Dorsey, Ralph Ellis, Herbert Jones, Thomas Kennedy, Harry Ziesenis, Artemus McClure, Clark William McColloch, Glen Otis, Ross Rummell, Oliver Cromwell Tucker, John Tupper, Theodore Rocklund.

DETROIT, MICH.—By Juvenile Detention Home: Lieut. Clifford B. Ballard.

TIPTON, MICH.—By the Red Cross: E. Leroy German.

FORT OMAHA, NEB.—By United States Army Balloon School: John Nagel, George Joseph Pahl, Maude Mae Butler, Walter P. Peterson, George H. Williams, Zell S. Killingsworth, Vernon G. Heverly, Dan A. Jacobs, Albert A. Bachand, John J. Nimmo, Albert L. Mower, Oscar K. Westberg, Hugh Scanlan.

NORFOLK, NEB.—By the High School: Charles Hyde, Harry Koenigstein, Roy McCaslin.

SUTTON, NEB.—By Mrs. A. W. Clark: Louis Case, Daniel Zimmerman, John P. Pauley.

AURORA, IND.—By Aurora Women's Research Club: Dewey H. Hauck, Henry Scharf, Russell Winkley, Bernard Burke, Frederick S. Steele, William Keith Ross, Charles Bildner, John Bildner.

EVANSVILLE, IND.—By Mrs. William Igleheart: Lieut. Douglas Viele.

GOSHEN, IND.—By Chamberlain School: Mayor Daniel J. Troyer.

CAIRO, ILL.—By Cairo Women's Club: Claude C. Robinson, Corp. Leonard A. Clifford, Paul Cochran, Lieut. Paul Clendenen, Hans Miller, Joseph Glynn, James Herring, Corp. George Mills, Arthur Lieberman, Morrin Langon, Cecil M. Reynolds, Dan Crowley, Jesse Lewis, Eddie Street, Edward Martin, David Brice, James Johnson, Charles F. Stokes, Willis Holland, Hunter Barksdale, James Bowden, Thomas Scarber, Lieut. Albert Stout, Sgt. Frank Gibson, Felix Eakins, George Coleman, Will Smith, Robert S. Courtney.

BELLEVILLE, ILL.—By School No. 2: William T. Smith; by School No. 4: Carmine Carcuccio; by School No. 3: George A. Younginger, Charles E. Morgan and George J. Kalvio.

CARBONDALE, ILL.—By Capt. John Brown: Donald Forsythe, Curtis Allison, William Watson, Lieut. Arthur R. Carter.

WHITE HALL, ILL.—By White Hall Round Table: Charles Martin; by White Hall Domestic Science Association: John Fisher; by White Hall Art League: Amos Walker.

ELGIN, ILL.—By Mrs. Edgar Post: Helen Penrose.

STAFFORD SPRINGS, CONN.—By Anna Handel: Madison Willis.

NORFOLK, VA.—First Christian Church: Shirley Owens

DIXIE, WASH.—By Dixie School: James Lauritson, Oliver Hastings.

TACOMA, WASH.—By Stadium High School: William Campbell, Malcolm Johnstone, Herman Uddenburg, Charles Huckaba, Elmer Anderson, Wilbur Cook, Arthur Wales, Clyde Moore, Duane Shields, Asa Purkey, George Muir.

MT. VERNON, WASH.—By Washington School: William Hilliker.

MYSTERIES AND REVELATIONS OF THE PLANT WORLD

BY D. LANGE

(WITH PHOTOGRAPHS BY THE AUTHOR)

THE GREAT Swedish naturalist Linnaeus, the father of modern scientific nomenclature, described about 10,000 different plants. Since his time scientific explorers have gone out to all parts of the earth to continue the census of the plant world, but to this day the census is still so far from complete that every year a hundred or more field men can each bring large collections of new species to the great herbariums of Europe and America. So vast has grown the number of plants discovered and described that if Linnaeus could come back to his beloved Upsala, he would be lost in his own realm, for his modest census of 10,000 plants has grown to the bewildering total of 250,000 and will very likely pass 300,000 before the last returns are in, if in fact, there will ever be any last returns.

Of this vast number of plants probably about 10,000 are trees ranging in size from the dwarfs, four feet high to the giants that reach nearly four hundred feet toward the clouds. About 150,000 species would be classed as flowering plants, including grasses, herbs, trees, vines and small woody plants of all kinds.

The delicate fronded ferns and their allies, the highest of the flowerless plants, would be represented by about 3,000 species mostly from tropical regions; and the tiny mosses, the humble pigmies among leaf-bearing plants, would add 16,000 species to the list.

The remarkable plants known as algae, which float as threads of green scum, or live as little green balls in water or moist places, or grow in the sea like the giant kelp, swell the census by at least 15,000.

The list would close with about 65,000 of that wonderfully diverse class of vegetables forms known as fungi. This class includes the small one-celled yeast plants, the parasitic blights, rusts and smuts, the various umbrella-shaped fungi popularly known as mushrooms and toadstools, the puffballs and many others. Each one of the 300,000 species lives and grows in its own peculiar way, but of very few do we know anything that approaches a complete life history.

Among this countless host of plants some species like certain orchids are so rare that several thousand dollars have been paid for one plant, while others flourish in associations so

THE BIRTHPLACE OF THE "FATHER OF WATERS"

The great Mississippi River starts as a small beaver stream under the roots of a fallen tamarack in Itasca Forest, Minnesota.

great that they cover large sections of whole continents. The best known but not the only examples of the latter are the grasses of the North American prairies, the conifers of our evergreen forests, and the broad-leaved trees of our great deciduous forest.

The heart of the great deciduous forest was the Ohio Valley. This forest consisted of an association of many

THE SHOWY ORCHID

One of the most beautiful flowers and readily identified as an orchid by its characteristic odor and taste, differentiating this class from all other plants.

species, and a century ago, it stretched almost without a break from the Atlantic Coast to Western Minnesota.

North of this broad-leaved forest extended a belt of evergreens to the limit of trees into sub-arctic regions and westward to the treeless plains. This vast forest consisted however of comparatively few species. In its southern region the white and Norway pines were the dominant trees. They grew taller and lived longer than any other species, and where fires or storms had not interfered for a century or two they had crowded out, or at least suppressed every other kind.

Farther north, especially on poorly drained lands, the black spruce becomes dominant, while vast swamps, too wet for the spruce, are covered with tamarack, which on better and higher land was crowded out by pines, spruces and other species.

From Illinois to the foothills of the Rocky Mountains stretched the largest grassy meadows of the world, known as the prairies.

The question why these great fertile regions remained treeless is not easily answered. Over a part of the prairies the rainfall is insufficient to meet the great demands of trees for water. For contrary to the popular idea, forests do not cause rainfall, but an abundant rainfall makes forests possible.

However, over a large part of the prairies other factors have operated against the spread of trees. The grasses developed early in the geological history of North America, and when the plains first emerged from the sea, the grasses were able to cover the soil before the trees could reach the new land. The compact unbroken sod formed by their roots made it difficult for trees to secure a footing, but wherever the soil was broken by streams and the waves and ice of lakes, trees and shrubs have successfully invaded the great plains and now fringe every lake and river.

Nearly all the prairie grasses and flowers are perennials well fitted to resist annual or occasional severe droughts. Nor could millions of grazing buffaloes and the fires started by lightning or by primitive man harm the underground rootstock of these plants. To seedling trees, however, a fire means almost certain destruction.

On the western plains in the Bad Lands region and in

SKUNK CABBAGE—FIRST FLOWER OF THE NORTHERN STATES AND CANADA

The large seeds have most likely been scattered by bears.

the foothill country the short grasses are rendered still more drought-resistant by having their roots protected by hard impervious sheaths. These grasses produce the black-root sod, which western ranchers and pioneers employ as building material, and the walls constructed of black-root sod are almost as durable as those built of brick.

Leaving out of consideration here the rather complex problem of plant distribution over the Black Hills, the Rocky Mountains and the Great Basin we reach on the

Sierra, the Olympic and the Cascade Mountains the grandest and most remarkable forest of the world, which stretches from California northward to the limit of trees in Alaska, through more than two thousand miles of latitude.

From California to Puget Sound is a forest of enormous redwoods, yellow pines, Douglas firs, western hemlock and other evergreens, including the remarkable isolated groves of giant sequoias containing trees of almost incredible size and age. But not only the great sequoias but also the redwoods and firs are giants, often reaching a height of two hundred to three hundred feet. In these forests the little Douglas squirrel and a number of small birds live permanently in the tree tops and, as one boy expressed it to me, can only be studied through a telescope.

In extent, in density, in the kinds and size of their trees, these forests have no rival on our planet.

Besides the fascinating questions regarding the size, the distributions and survival of their component species they present another perplexing problem: They are the most exclusively coniferous forests in the world. Broad-leaved trees here and there make up six per cent of the whole, but in many regions they form only a small fraction of one per cent.

Very few representatives of our eastern forest regions can be found here. There are no elms, no hickories, no chestnuts, no catalpas, persimmons, sassafras, magnolias; no linden, no tulip trees, no locusts; and many other whole genera found from the Atlantic coast to the plains are entirely absent.

A RIVER BOTTOM FOREST OF YOUNG ELMS
The seeds of the elm, birch, maple and ash are carried by both wind and water.

Several oaks, a few maples, one birch, one ash and an alder are among the scant representatives of broad-leaved trees, but they seem to live only by sufferance in a forest which everywhere presents an unbroken array of the somber spires of the conifers.

In preglacial times the coast region did possess elms and beeches as well as gum trees, magnolias and chestnuts. Why these and others have disappeared never to return is one of the great riddles of the plant world.

In some regions of the earth, a rankly growing vegetation has almost suppressed human and animal life. This is true of the great rain-soaked beech forests of temperate South America, which Darwin describes so well in his journey on the Beagle, and of the tropical forests of Africa. Another illustration of this dominance of plant life is furnished by the great tropical forests of the Amazon Valley of which the English naturalist and collector, Bates, has furnished us a classic account in "The Naturalist on the River Amazon." In tropical Africa human dwarfs have found a refuge in the impenetrable forest, and the monkeys of the Amazon Valley are compelled to live in the tree tops.

The greatest development of higher animal life has taken place in open and comparatively dry regions. Semi-arid South Africa is the home of the greatest number of species of big game, while the buffalo herds of the North American prairies and the caribou herds of the Arctic tundras, are equalled nowhere else on earth.

The length of life among plants varies even more than among animals.

The edible inky mushroom produces its umbrella-shaped column over night. A few days later the whole plant has deliquesced into a patch of black ink, and within a week not a trace is left of its existence.

The giant sequoia, on the other hand, has outlived the great empires of human history, enjoying a vigorous growth for three or even four thousand years. No fungus or insect pest is able to harm it. Its top reaches three hundred and fifty feet toward the sky and if storms, lightning and resulting fires did not at last bring it down, it seems that it might live and grow forever. And when, in the end, the giant trunk has crashed to earth amongst the smaller trees surrounding it, a long depression in the soil tells of the big tree even centuries after forest fires have consumed the enormous mass of sound wood, to which fungus, insects and the tooth of time could do no harm. Some of the giants still growing in Mariposa Park were already big trees, as New England and Minnesota measure trees, when Abraham pastured his flocks in Palestine.

Curious and innumerable are the methods of traveling adopted by plants. Most plants can, of course, travel only as seeds, although there are not a few exceptions to this rule.

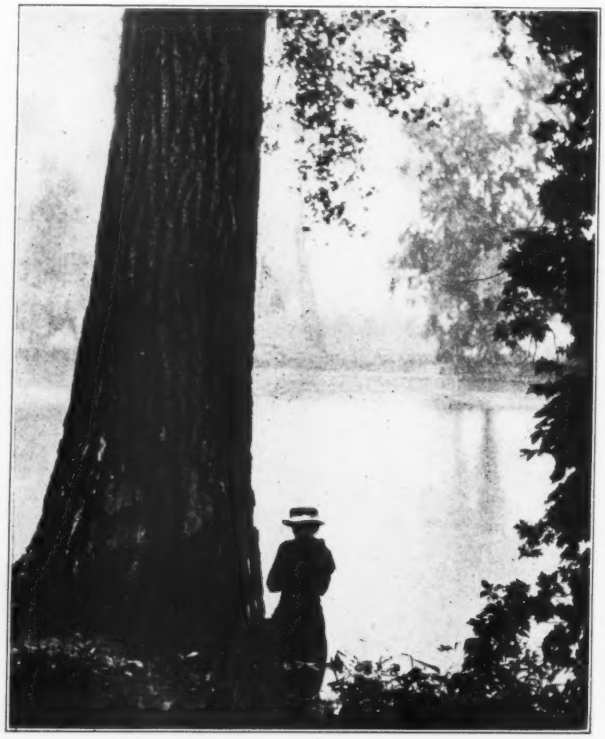
The advantage of the first comer, the squatter, one might say, plays an important part in the world of plant

life. The cotton tufted seeds of willows and poplars, and the little winged seeds of the white birch are carried by the wind in every direction, and they are produced in such abundance, that every nook and patch of bare soil receives its supply. The result is that these trees generally reach vacant land sooner than any of their competitors. The bare mud-flat left by a flood, the railroad gravel pit, the burnt-over and cut-over pinery are nearly always pre-empted by willows, poplars, or birches because their seeds are much more widely disseminated than the seeds of any other northern trees. Poplars and birches, however, are short-lived trees, and within a century the dominant pines will supplant them.

Shrubs and trees, as well as vines and herbs, that depend on birds for the dissemination of their seeds run the wind-planted species a close race. Woodbine and wild grapes, elder, dogwood and hackberry, wild cherries and plums, strawberries and raspberries spring up as if by magic as soon as the lumberman, fire or storm have cleared the ground for them.

Of many plants it is not very difficult to discover their methods of traveling.

The seed of maple, pine and dandelion sail like parachutes away from the parent plant. The gold-dotted hedges of jewel weed, or touch-me-not, which mirror their delicate flowers and foliage in the dark, silent water of northern beaver ponds are planted by the beavers themselves as they travel and work on their dams; while birds in their daily and seasonal flights, plant those remarkable gardens of many kinds of wild fruit, whose presence on widely separated islands and mountains and in the depth of isolated canyons delights both the eye and the palate of the explorer.



GIANT COTTONWOOD GROWING CLOSE TO THE RIVER

A cottonwood will grow eighteen feet high from a seed in three seasons. Within sixty years it is a giant.

There are, however, numerous instances of plant distribution which present most interesting puzzles to naturalists and foresters.

The limber pine is a fairly common tree at an altitude of six thousand feet in the Rocky Mountains. It is not found on the stretch of two hundred miles lying between the Rocky Mountains and the Black Hills, but on the trail to Harney Peak, in the heart of the Black Hills, at an altitude of about six thousand feet, stands a grove of about twenty-five limber pines, the only trees of that kind thus far discovered in the Black Hills. How they traveled over the intervening two hundred miles is a mystery. One of the most puzzling cases of plant migration or distribution is that of the devil's club. This plant is a common shrub in the moist forests of the Pacific coast and in certain localities in the Rocky Mountains, where, on account of its countless sharp spines it is the terror of woodsmen and timber cruisers. It is not found in the forests touching the Great Lakes, except in several spots on Isle Royale in Lake Superior. By what means it traversed the intervening thousand miles of plain and forest and established itself on an island in Lake Superior seems an insolvable riddle.

One possible solution must not be overlooked in such cases as that of the devil's club and the limber pine. They may be cases of a remnant vegetation, just as scattered groves of giant sequoias are undoubtedly only the remnants of former large sequoia forests.

Such remnants are not rare. On Sheep Mountain, in the Bad Lands of South Dakota, I found isolated groves of yellow pine separated by a distance of fifty miles from the yellow pine forests of the Black Hills. I was much surprised to find that porcupines had killed a large number of these trees that were trying to maintain their hold on life under severe conditions of climate and soil, for one naturally thinks of porcupines as inhabitants of moist northern forests.

There has just lately been discovered a natural grove of jackpine in the driftless area of Minnesota, in Houston county, the most southeasterly county of the state. These trees are outposts of a former period and were left far behind, as the belt of evergreens retreated northward with the vanishing continental glacier. On their shaded sandy hillside these northern trees may keep a foothold for centuries to come, although the jackpine forest has moved fully a hundred miles north.

The case of the Kentucky coffee tree has been a mystery to me ever since I first saw its odd, bluntly ending branches on a winter ramble in a Minnesota woods. The tree bears large bean-like pods containing big hard-shelled seeds resembling somewhat in appearance roasted coffee beans. The great pods remain on the trees through the winter. Neither the pods nor the beans float in water and are, of course much too heavy to be carried by the wind. The seeds are as hard as pebbles, and, as far as I have been able to discover, no birds or animals eat

them. I kept a dozen of them in water for a year and found by frequent weighing that they did not absorb even a grain of water; but I also found that if they are planted in fall they will sprout in the first or second spring following. One seed I gave to a tame gray squirrel. He drilled a small hole through the shell, but dropped the seed as soon as he had reached the meat.

The tree, although one of our rarer forest trees, is fairly well distributed from Tennessee to Ontario and from Pennsylvania to the Indian Territory, but it grows in small colonies, often miles apart. It is found on rich bottom lands and on islands in large lakes. It may be that grouse occasionally swallow the seeds as they swallow pebbles, for it seems impossible that the seeds could reach islands without the aid of some bird. It is likely that the passenger pigeons in days gone by distributed the seeds of the coffee tree.

A small cactus, the jointed opuntia, is widely distributed in arid regions from New Mexico northward. In some mysterious way it has reached many dry rocky ledges in humid Minnesota and Wisconsin. A few years ago on a canoe trip on Lake of the Woods I found a fresh joint of this cactus among the boulders of the Ontario shore in a densely wooded region. How the plant reached this spot has remained a secret to me.

A whole book of miracles might be written on the mutual adaptations between flowers and insects. That many flowers are adapted to cross-pollination by insects is a fact of common knowledge, but that some of these adaptations have been perfected, one might say, beyond perfection, is not so generally known.

A WONDERFULLY BEAUTIFUL SPECIMEN

This stately white pine was planted for shade and ornament near a city home.

All our species of milkweeds, for instance, depend for pollination absolutely on insects. The peculiar structure of the flowers makes any other method impossible. Moreover the work is restricted to wasps and to large butterflies and moths. Small insects, even those as large as houseflies and honeybees are not strong enough to pull the anthers, shaped like tiny saddle-bags, out of their sheaths. To those insects the honey-filled and sometimes actually honey-dripping milkweed flowers are like so many baited traps, as deadly and remorseless to the hungry insects as the steel traps of the fur hunter are to bears and beavers. Their feet are caught on the specks of sticky gum, which mark the joint of the two halves of the saddle-bag anthers. Trapped in this manner they are held prisoners until they die, and their shrivelled bodies may be found on almost every patch of milkweeds.

One might think that the powerful bumblebee and the milkweed would make ideal partners, but such is not the case. These remarkable plants, which not only flow with honey, but also invite their insect guests by a strong honey scent, are utterly ignored by the big hungry bumblebee, who have, for some unknown reason, acquired a passion for the purple of the clover and the blue of lobelias and gentians; although to the human observer, getting honey out of these flowers seems a truly laborious task.

The closed gentian, found in bloom in this latitude from the latter part of August to the middle of October, furnishes one of the most remarkable cases of adaptation of a flower to bumblebees. The striking whirls of beautiful sky-blue flowers are evidently a kind of bill-board advertisement to bumblebees. But these magnificent blue flowers, often made still more conspicuous by being delicately tipped with white seldom open. Day and night, in sunshine as well as in rain and fog, they remain tightly closed. Many observers have been led to conclude that this fine autumn flower had abandoned cross-pollination and resorted to self-pollination; however, careful observation has convinced me that such is not the case. The bumblebees do get into these closed gentians. In fact, I do not think they miss a flower on those plants that grow in the open, where the gentians are not hidden by tall grasses.

With great care the hard working bumblebee selects a flower that has not been pumped dry by a buzzing competitor. Then, with his strong and long proboscis he finds the opening in the closely folded floral segments. With his head he pries the five segments apart and now, literally standing on his head he kicks and pulls himself with great effort into the blue honey well, until only his defensive posterior and a pair of legs remain partly visible, and if he is not a good sized bumblebee he disappears altogether. I watched one on a sunny September day, and I thought he worked harder than any other

bee I had ever observed. He examined flower after flower, many he rejected without opening them, in some he remained only an instant, but in one he stood on his head for fifteen seconds. Why does his tribe ignore the inviting flowing wells of the milkweeds and work laboriously on such difficult flowers as clovers and lobelias and the refractory closed gentians? And why does not this flower open like other gentians? Are the permanently closed flowers only a device to keep out feeble unbidden guests, or do they also serve to exclude dew, rain and frost, which might injure the delicate floral organs inside?

OPEN GROVE OF BUSHY RED CEDAR ON SHEEP MOUNTAIN IN THE BAD LANDS
The seeds of the red cedar are planted by the birds.

We all know trees and other plants by their leaves, which in shape, size and position display endless variety. Is there a meaning to all the different shapes and positions, or are some of them just accidents that have no meaning?

In general it may be said that each plant has evolved or is trying to evolve that shape, size or position of foliage, which serves best under its special environment to intercept the most favorable amount of sunlight and to regulate best the absorption of carbon dioxide from the air and the evaporation of water into the air. But why have nearly all the oaks adopted the lobed pattern of foliage as their own, while the large pea and bean family almost unanimously favor the pinnate or divided form? The maples all adhere to their well-known family pattern, and no conifer departs from the needle-shaped foliage of pines and spruces.

Certain plant structures and substances are evidently produced for protection against specific dangers.

Cattle will not allow young hazel, oak and most other trees and shrubs to survive in a pasture, but the thorn-apple bushes will flourish because their sharp thorns keep away the browsing cattle.

There is a certain tree, the honey locust, which I venture to say no boy has ever climbed, although the tree is common and well known from New York to Illinois and from Texas to Ontario. Around the trunk most formidable, branched thorns stand out, some reaching almost two feet in length with the thickness of a man's finger. The locust trees and their relatives have a tendency to run to thorns. Do the murderous looking thorns, set like bristling bayonettes around the trunk, perform a useful function, or are they merely a case of a family trait run riot? Perhaps they keep opossums, raccoons and bears from climbing the trees and devouring the sweet seed-pods, but I have had no opportunity to prove this surmise.

Each plant or family of plants produces certain substances which possess a characteristic taste and odor and other generic qualities.

Practically all the orchids of the world contain a sap of an odor and taste so characteristic that a blind person, with his hands tied, might distinguish orchids from other plants by using only his sense of smell and taste; but thus far no botanist has discovered the meaning of the peculiar fluid of the orchid family.

SCRUBBY WHITE PINE ON ROCKY ISLAND OF LAKE OF THE WOODS
A most attractive spot, and well patronized by vacationists.

All the conifers of the world produce rosin or pitch. A

very large number of composites, the typical prairie flowers, also produce small amounts of rosin, and the foliage of nearly all of them emits the pungent odor of rosin.

WHITE HEARTS, OR "DUTCHMAN'S BREECHES"

How they travel from woodland to woodland is still a mystery.

Trees are always exposed to attacks from two hosts of enemies, fungi and insects. A wound in a conifer immediately causes a flow of rosin. The rosin embalms, so to speak, any fungus spores or insects that might find their way into the wound. The liquid rosin soon hardens and seals up the wound and, in the course of years, new wood grows over the antiseptic covering. The function of rosin in defending trees against insects was well shown in recent years after the great devastation caused in the yellow pine forests of the Black Hills by several species of bark-boring beetles. Fires and drought had weakened the trees and gave the beetles a great advantage for several years, so that they destroyed thousands of acres of fine forest. Then the government organized its forest service and prevented fires. Rainy seasons also returned, and the beetles began to be found dead in their tunnels under the bark drowned in the flow of rosin of the healthy and vigorous trees.

The meaning of the poison in the loco-weed of the western plains seems fairly clear. It protected the plants from extermination by the herds of wild buffalo, who evidently had learned to avoid it, for none of the early observers speak of finding "locoed" buffaloes. Domestic cattle, on the other hand have not yet learned to avoid it and are often killed by it, especially in seasons of poor pasture

But what is the meaning of the alkaline poison in the poison ivy and poison sumach? Would it have the same effect on browsing animals that it has on the skin of many humans? The poison evidently has no injurious effect on birds, because they eat freely of the white berries and scatter the seeds far and wide.

BLUE ANISE-FLOWER OR GIANT HYSSOP

The method of dissemination of this lovely flower is also unknown.

Certain plant forms, although they must be fairly common in nature, are nevertheless rarely found by naturalists and botanists.

The little green floating duckweeds, abundant on every pond in late summer, seldom produce their simple flowers and although I have been familiar with the plants since boyhood schooldays, I have never found the flowers.

The jointed scouring rushes, also known as horsetails or equisetae, grow from small dust-like spores. They are common plants, but it is almost impossible to find them in their first, or prothallium stage. Only once, in the month of July, did I find them as little green lumps on moist earth which had been pushed up from a lake bottom by a railroad fill. Many ferns are very common, but very few botanists and lovers of flowers have ever found the small heart-shaped fern babies except in greenhouses.

BLUEBELLS OF SCOTLAND

The method of dissemination of this delicate flower is unknown.

The beautiful pink-and-white moccasin flowers are fairly common in their favorite localities, moist meadows and spruce and tamarack swamps. But something seems to be mysteriously wrong with their methods of pollination and seeding. Many of the flowers remain unpollinated, and, of the millions of minute seeds produced, very, very few ever start a new plant. One could not find

ROSIN WEED

It grows twelve feet high and is the giant among prairie flowers.

CLOSED GENTIANS

Flaunting beautiful sky-blue flowers to tempt the bumble-bee.

BLUE LOBELIAS

The seeds of this dainty flower are probably scattered by the wind.

a seedling to a thousand adult plants. By the most careful search I have not found more than a dozen all told, and when a seed does start, it produces a most frail plantlet. Its stem, during the first season grows scarcely an inch high, the leaves are mere specks, and its tiny rootlets do not reach the soil through the thick cushion of moss on which the seedling nearly always starts.

Every year, however, the root approaches by a kind of hook-shaped growth a little nearer to the soil below, but I estimate that it must take a seedling from five to six years to establish itself as a vigorous plant whose future is assured. If nature had evolved a really successful plan of pollination and seeding in the moccasin family those beautiful plants should be a hundred times as numerous, for the mature plants are vigorous and hardy perennials.

One of the most widely distributed plants over the whole northern hemisphere is the pale-green peat moss, sphagnum. It covers thousands of square miles in Europe, North America and Asia; but it has almost abandoned the sexual method of reproduction, and the little spore capsules characteristic of all mosses are rarely found. I have traveled over and camped near peat bogs and marshes ever since my early boyhood, but only once have I found the brown spore capsules, and that was in a small rocky basin on an island in Lake Superior at the entrance to the harbor of Grand Marais. I took the plants home to my room in the hotel, and in the evening as I was reading by lamplight, my attention was attracted by several explosions, just barely audible. I began to watch my moss plants. The warmth of the room had dried the capsules to the explosive stage and every time one of the little shells burst, a tiny brown cloud of spores was thrown into the air. It was the most intimate performance in the great drama of the plant world which it has ever been my good fortune to witness. The scene was enacted on an August evening more than ten years ago, and every summer since then, I have looked for the little brown shrapnels of sphagnum but I have never found them again.

A NATIONAL FOREST POLICY

THE PROPOSED LEGISLATION

BY HENRY S. GRAVES

FORESTER, U. S. FOREST SERVICE

THE NEED OF A NATIONAL FOREST POLICY TO PROVIDE FOR THE PERPETUATION OF OUR TIMBER SUPPLY IS APPARENT TO FORESTERS, LUMBERMEN, TIMBERLAND OWNERS AND EVERYONE. WHAT THIS POLICY SHALL BE, HOW IT SHALL AFFECT PRIVATELY OWNED TIMBER LANDS, NATIONAL, STATE OR MUNICIPAL HOLDINGS, AND HOW A POLICY MAY BE ADOPTED AND ENFORCED, IS NOW THE SUBJECT FOR DISCUSSION.

AMERICAN FORESTRY MAGAZINE OPENS ITS COLUMNS TO ARTICLES ON ANY AND ALL PHASES OF THIS IMPORTANT TOPIC, AND OPINIONS ON THE SUBJECT WILL BE WELCOMED.—EDITOR.

ANY program of forestry which is comprehensive enough to anything like meet the needs of the country must involve the practice of forestry on privately owned timberlands. In my judgment this will not be brought about merely by educational methods. These have been tried for twenty years practically without result. There must be some requirement on the part of the public as to forest protection and as to forest renewal. The requirement must be nearly as possible equalized in all sections of the country and in all States so that no section or State will be placed at disadvantage.

The Forest Service has given considerable thought recently to the principles which must underlie any efforts toward the attainment of this desirable end. We have reached the conclusion that a satisfactory measure of success can be attained only through some plan of co-operation between the States and the Federal Government, with the States the active agents for carrying the plan into effect and with the Federal Government stimulating action and aiding the States.

We have worked out some of the principles which it seems to me should form the foundation of the system to be built up through the necessary legislation by the Federal and State Governments.

The principles of legislation requiring the practice of forestry on private lands are briefly as follows:

1. The first step should be a Federal act authorizing the Secretary of Agriculture, in co-operation with any State, to formulate plans for forest protection and for the control of timber cutting within that State. Such plans should become effective only after the State legislature had passed appropriate legislation, including adequate appropriation to co-operate with the Federal Government in putting them into effect. The Secretary of Agriculture should also be authorized to accept plans for protection or cutting which have been adopted by any State. Section 2 of the Weeks Law dealing with co-operative fire protection would therefore be superseded. The act should carry an appropriation.

2. Farm woodlands should be specifically exempted from the provisions of the act, for the reason that protection and conservative cutting for this class of forest can best be brought about through the education and demonstration work authorized by the Smith-Lever Act. The Secretary of Agriculture should be authorized, in co-operation with the State, to define farm woodlands and distinguish between them and commercial timberlands.

3. All commercial timberlands and all cut-over lands on which a commercial forest (as distinguished from a farm forest) could be grown should be subject to the provisions of the act. But the Secretary of Agriculture, with the approval of the State, should be authorized to exempt any of such lands where it is demonstrated that the surface of such lands is more valuable for other purposes than for the production of timber and where such lands are immediately to be used for the more valuable purpose.

4. Owners of timber should not be compensated either by the State or by the United States for expenses incurred in carrying out the provisions of the act where only the renewal of the forest is concerned. But such owners should be compensated either by the State or by the United States (if by the latter, in the discretion of the Secretary of Agriculture) in the following instances:

(a) Where for protection of the watersheds or for other protective purposes it is necessary that the timber should remain standing.

(b) Where as a reserve of timber for future supply it is necessary that cutting should be deferred.

(c) Where it is necessary to remove the timber in order to prevent the spread of insect depredations or injury from other causes.

5. Every State accepting the provisions of the Federal act should itself have enacted legislation:

(a) Which provides adequate fire laws with suitable penalties for violation thereof; and

(b) Which not only prohibits the violation of such rules and regulations as might be prescribed by the State and the Secretary of Agriculture in respect to the cutting of timber or the removal of any products thereof, and provides a penalty for such violation, but prohibits the shipment and sale of forest products manufactured from timber cut or worked in violation of such rules and regulations.

(c) Which establishes an adequate administrative machine for making the laws effective, and appropriates funds to meet the conditions of co-operation.

6. Federal participation should be based upon the precedent of co-operation with the States in policies of

education and development and upon the commerce clause of the Constitution. The Federal act should prohibit from interstate shipment any forest products cut or removed in violation of State law. (Ref. Act prohibiting shipment of intoxicants from wet into dry states.)

7. The State Forester, or other official with corresponding authority, should be charged with the responsibility of administering the law. He should be appointed to a position in the Forest Service in order to exercise the authority granted to the Secretary of Agriculture. The police powers of the State should be extended to the necessary Federal employes. Administrative supervision of the work should be exercised by the Forest Service.

8. The expenditure of Federal funds should be authorized on the basis of the Federal Government paying not to exceed one-half of the cost. The remaining half would be paid by the States either from their general funds or from special funds raised by tax levies, such as the timberland tax in Maine, the severance tax in Louisiana, and the compulsory patrol tax in Washington and Oregon.

Any Federal funds which might be necessary for the purposes of compensation described in paragraph 4 should be carried in a companion act having in view primarily the acquisition of forest lands by the Federal Government.

9. In consideration of the Federal co-operation and aid offered under the plan, any State which accepts it will be urged to enact legislation that will relieve standing timber from burdensome taxes by placing a nominal tax on the land and deferring the tax on the timber until cut.

A DISCUSSION OF METHODS

BY R. S. KELLOGG

SECRETARY, NEWS PRINT SERVICE BUREAU

THERE is no doubt about the necessity for a national forest policy and that it should be speedily inaugurated if we are to have anywhere near adequate timber supplies in the not very distant future. I am heartily in accord with the discussion and the intention to keep the matter before the public until the way is paved for the beginning of the solution of the problem. Anything that I may say, therefore, is a criticism of methods and details and not as opposition to the general purposes, with which I am in sympathy.

After giving the matter very serious consideration, I am unable to approve most of the nine provisions set forth in Forester Graves' statement on the principles of legislation requiring the practice of forestry on private lands. I don't believe that it is either practical or expedient to compel the practice of forestry upon private lands through the interstate commerce provisions of the Constitution:

First, because as shown in a matter upon which there is so much public sentiment as that of child labor, the attempt to accomplish desirable reforms through indirect means has twice fallen down; and

Second, because a coercive program of this sort would immediately alienate and render hostile a large proportion of the timberland owners, thus demonstrating once more the statement made a long time ago by high authority that "forestry is practiced everywhere except in the woods."

In my judgment it is not practicable to line up all the timber states in the multitude of details that program of "mandatory forestry" requires. Even in the one single matter of forest taxation—concerning which foresters and timberland owners have been in substantial agreement—little progress has been made after years of agitation. How much longer will it take to make progress in matters in which foresters and timberland owners are in opposition? As a matter of fact, we are now coming to see that the States are very loath to make tax concessions to any one enterprise or form of industry, and while I am in entire sympathy with the suggested changes in forest taxation, I still carry in the back of my head the idea that after all if forestry is a business proposition it must pay dividends under business conditions.

Politics always plays havoc with forestry. There would be no limit to the trouble that would result were forestry made compulsory upon the private owner through enactment and regulation by Congress and forty legislatures.

It seems to me that the time has come when the professional foresters of the United States should be frank enough to acknowledge what those who have had practical experience saw long ago, namely, that the growing of large sized timber of the ordinary commercial species is an operation too long in time, too hazardous in risk, and too low in rate of return to attract private capital, and that an attempt, national or State, to force private capital by legal enactment to engage in undertakings that are not profitable is doomed to failure. Forestry must be economically sound or it will not succeed.

My suggestions of constructive nature are:

First: A timber census and land classification to determine what we have in the way of present supplies and the areas which may be properly classified as affording opportunity for future and permanent supplies.

Second: A great enlargement and extension to all appropriate parts of the country of the purchase of cut-over lands, for which ample precedent has been established in the White Mountains and Southern Appalachians.

Third: Much more vigorous and general extension of Federal co-operation in fire prevention along the line of

the Weeks Law, coupled with such additional measures as may seem best in the different States to reduce the fire hazard and afford opportunity for natural reproduction. The States can go a long way in fire control and the mandatory principle can be applied here much more successfully than it can be applied to either cutting or reforesting operations on private lands.

Fourth: The acquirement of a reserve supply of merchantable timber in the West through the outright purchase of timberland financed by the issuing of timber bonds or perhaps the carrying of a reserve supply in private ownership through some form of co-operation with the State and national governments.

I am just as strongly in favor of a great increase in the area of publicly owned timberland (national, State or municipal) and an increase in the scope and effectiveness of fire prevention measures as I am opposed to either Government operation of saw mills or the placing of compulsion upon the private owner to grow timber upon his land in case he is not so disposed.

PENNSYLVANIA'S OPINION

BY GEORGE H. WIRT

CHIEF FOREST FIRE WARDEN OF PENNSYLVANIA

"WE HAVE VISED THIS REPLY, APPROVE IT, AND HAVE DIRECTED THAT IT SHALL REPRESENT THE ATTITUDE OF THE PENNSYLVANIA DEPARTMENT OF FORESTRY."—ROBERT S. CONKLIN, COMMISSIONER OF FORESTRY.

THERE is no question in my mind as to the necessity for a national forestry program, and I see no reason why such a program should not be worked out immediately. This program should be preceded by a short and concise statement, setting forth just what is necessary to be accomplished in order to provide the economic factors which can be obtained only by a rational handling of the forest areas of the country, and reasons why these things must be provided for as indicated by the present demands for forest products and the present inability to have these demands satisfied.

Necessarily, the methods by which the end in view may be accomplished will differ in different states and in different forest regions. In the first place I believe that the most essential factor in the national program must continue to be the educational work. I cannot endorse your statement to the effect that the education of the last twenty years is practically without result. We have had forestry education in Pennsylvania since 1870, and I am convinced that the results are more than commensurate with the efforts put forth. If any fault is to be found it is with the lack of method, organization, and persistency in educational activities and with the inappropriateness and generality of the material used by national, state, association, and private forces.

My first suggestion, therefore, in the national program is for a co-operative scheme by reason of which the national, state, association, and private educational activities may be made effective and kept continuously so. The foresters of the country do not need to be persuaded, because of the facts which they have at hand and with which they are familiar. When the facts which we have are made common knowledge, there will be little or no question as to the outcome.

Along with the educational campaign, the state and nation must collect exact information in order to back up the claim for a continued forestry activity. We must have more complete and definite information as to the actual amount of timber available and the amount of timber growing or capable of being grown in the country. There must, also, be continued researches which will lead to the conservation of present supplies and the bringing of wood growers and wood users together satisfactorily.

Both state and nation may continue as fast as their educational campaign will produce means, to extend public forests and to manage them properly. They must also recognize the community interest in the protection of forests and work out to the best possible advantage necessary means for helping the timber owners to protect the forests from fire and destructive agencies. The tax question also must be solved.

This leads directly to the matter of legislation. There must be some law, and, while it is possible in some cases to obtain satisfactory laws without the support of a public understanding the necessity for the law, yet such cases are rare and where such law is obtained its enforcement is very unsatisfactory. So in each part of a national program we are brought back to the necessity for an educational campaign, not for a short period of time but continuously.

I cannot say that I endorse a program which implies upon the part of the national government anything more than what may be necessary to assist the states to do their work satisfactorily. The present co-operation under the Weeks Law might be extended for the protection of forests from fire. I can see no reason for national legislation working to the control of timber cutting within the states, nor do I see any necessity for the national government spending money within any of the states in connection with farm woodlands, except that it might be specifically stated within an amendment to the Smith-Lever Act that the state colleges which receive national funds under this act must assist the farmers in the management of the same as a part of the general farm education required.

With respect to compensation of forest owners for what are distinctly protection forests, I would say that this ought to come under the forest purchase laws either of state or nation and such lands should be bought outright under the right of eminent domain, if necessary, without necessitating the review of private operations.

It strikes me that the plan to enter the various states under a co-operative agreement upon a fifty-fifty basis other than for educational purposes and for what may be distinctly of national value in the protection of streams affecting several states, is unwise.

I also consider it extremely unwise to create an organization such as would be created under item No. 7 of principles of legislation. Each state forestry association would necessarily be under obligations to the national officials.

It strikes me that the most important service the national government can render in the national program of forestry is to act as a clearing house for the various activities of the states and to keep all of the foresters informed as to national and local conditions, so that the officials of each state may have at hand information which may be of value in avoiding errors and in taking advantage of methods which have proved to be successful, and to continue such investigations as it is impossible for any state to continue by itself.

CONTROL OF GROWING FORESTS

BY ALFRED GASKILL, STATE FORESTER OF NEW JERSEY

BEYOND all question there is need for serious consideration of the forest situation in this country. Though that situation is in no essential way different from what it has been for years, the necessity for effective action is accentuated by the evidence, now clear to every observer, that there is an insufficient replacement of the waning store of timber in this country.

What should be done cannot be decided offhand, or by any man. A full discussion of the conditions, opportunities, and needs in each section of the country must precede the formulation of a policy.

A policy to be truly national must have in mind the necessities of the nation as a whole, yet with full recognition of the facts that the greater part of the forest lands in this country are in private possession and under state, not federal, control.

The discussion of the problem thus far has seemed to confuse the situation as represented by the stumpage holders, chiefly in the West and South, who are overloaded, and as represented by the public interest in growing, as distinguished from mature, forests. The first condition should be resolved by economic, chiefly financial, measures; the second demands the best thought of every forester, to the end that the next generation shall have enough lumber.

And I cannot agree with some foresters that the lumbermen have no interest in the question. That their interest is largely, or solely, financial is a fact, but present conditions must change radically before lumbering can become localized and permanent. So long as virgin timber remains it will be an attraction to exploiters, and I can see no escape from the conclusion that we must suffer the exploitation of most of our virgin stands before silviculture finds opportunity to take hold. I have never believed, and do not now believe, that forestry can play any large part in lumbering operations dealing with virgin timber.

The proposal lately made that forest owners be compelled to handle their properties under the advice of foresters is of doubtful wisdom. Desirable as it is to make the nation's stock of high grade lumber last longer than it now promises to last, there seems to be no argument to support the proposition that property interests in standing timber shall be sacrificed to a hope rather than a promise, much less a guarantee, that what is spared now can be realized on after a while.

If this view is radical it springs from a conviction that there must be a greater assurance than there now is in any part of the country that an investment in growing timber—not mature timber, is a safe investment. Before we can approach the owners of timber lands with any chance of securing results, before we can hope to impress legislatures and publicists with the reasonableness of our program, three things must be established; *first,* the fitness of a given area for continued use (through one rotation at least) as forest; *second,* security against destruction; and *third,* assurance of the total, or ultimate, tax levy.

The situation is critical but not hopeless by any means; a constructive policy probably can be based upon *encouragement* to woodland owners by the Federal Government and by the states; upon active *instruction and help* to the smaller woodland owners—similar to that furnished farmers; upon *fire protection;* and upon a modified tax practice; all of which will tend to establish an insurable interest in growing forests.

I emphasize the phrase "growing forests." To my mind the key of the situation is there—not in control over forests already mature, and which under every silvicultural law should fall to the ax as speedily as possible.

TO HELP in meeting war needs, the United States Forest Service in 1918 continued its efforts to secure full utilization of the forage resources of the National Forests. In 1917, because of the war, 23,000 more cattle and 71,000 more sheep were placed on the National Forests of California than had ever been grazed on them previously. In 1918 the numbers were still further increased by 18,000 cattle and 114,000 sheep.

THE tallest trees of the United States, says the *Canadian Forestry Journal,* are the California redwoods or the Douglas fir. Both claim the distinction of being the tallest, and it is an even match between them. A maximum of about 350 feet is the greatest, though a little more than that has been claimed. There is no question that in trunk diameter the redwood, that species known as sequoia, is the champion.

THE SEVENTEEN-YEAR LOCUST

BY DR. R. W. SHUFELDT, C. M. Z. S.

(PHOTOGRAPHS BY THE AUTHOR)

THE din created by the droning hum of an immense army of seventeen-year cicadas (they are not locusts, though generally called locusts) has been heard coming from the trees and bushes in many places during the past several weeks. The continuous hum of millions of these curious insects is heard throughout the entire day, from early morn until sundown.

From the ninth to the twelfth of May, especially where there are mostly maples and oaks, there appeared perfect hosts of curious, dark amber-colored creatures that helplessly crawled about, each making an effort to reach something that it could creep up upon. Mingled with these were many "locusts" of the kind here shown in Figure 2. Thousands of the helpless horde were crushed underfoot. In some cities and towns the sidewalks were absolutely slippery with the mashed bodies of the victims, while hundreds of thousands of others had escaped this fate through climbing up on the trees, fences, and other supports in their neighborhoods.

These "bugs" do not bite or sting, and they fall into a very interesting family of insects known as the *Cicadidæ*, being popularly called locusts, cicadas, and sometimes harvest-flies. However, they must not be in any way confused with the various species of grasshopper-like insects that are the true locust, such as our American locust (*Schistocera americana*), or with those that during various periods of history formed the great flights in the Old World. Such phenomena are more or less fully described in some of the very oldest works we have, as the locust swarms of ancient Egypt. Many thoughtless people take our seventeen-year cicada to be identically the same species; and, too, as a rare occurrence, we still meet with some pious, old dame who shudders at the sight and sound of these harmless hordes, drawing a long breath when the "flight" is over and the people have escaped the punishment following upon some

Fig. 1. DRIED, EMPTY "SKINS" OF THE SEVENTEEN-YEAR CICADA, ATTACHED TO THE LEAVES AND FLOWERS OF THE MAPLE-LEAF VIBURNUM. THERE IS ONE PERFECT INSECT NEAR THE MIDDLE OF THE PICTURE. SLIGHTLY REDUCED.

willful misdemeanors of the nation. Of these cicadas there are a number of species, all looking very much alike, some being very large and some very small, with color in general agreement; their common appearance is well shown in the cuts illustrating this article. Several species are found in Europe and several still different kinds in the Americas. All true cicadas belong to the Order *Hemiptera,* and constitute the typical genus of the family *Cicadidæ*. All are of comparatively good size, the males having under their wings peculiar little "drums" wherewith they make the humming note so familiar to all, while the female has a most interesting history. She deposits her eggs from about the end of May through the entire month of June; these are discovered to be in pairs in the twigs of many kinds of oaks and other trees, and are very small, spindle-shaped objects.

In the case of this seventeen-year cicada, the larvæ hatch out in about six weeks from the time the female lays the eggs; they then immediately fall to the ground, into which they burrow, to spend the next seventeen years of their lives, remaining only a few days in the pupa stage. During all this time, their only food consists of the juices of the roots of certain trees, they being provided with the means of sucking the roots.

Fig. 2. SEVENTEEN-YEAR CICADAS, WITH ONE EMPTY SKIN-CASE. WASHINGTON SPECIMENS OF 1919, FROM LIFE AND NATURAL SIZE. NOTE THE DISPOSITION TO ADVANCE THE FORE-PAIR OF LEGS.

It has been shown that the female is quite indifferent to the kind of tree, shrub, or brush into the twigs of which she deposits her eggs. Often much harm is thus done to fruit trees, such as the apple and pear; and so severe is the treatment sometimes and the number of punctures sustained, that the death of the tree follows. Peach trees have been thus destroyed, proving the cicada to be, in many instances, a harmful insect. When cherry trees are selected, the exuding gum usually seals in the egg or young, and they never come to anything. Some females show wonderful fecundity, the line of minute punctures for the eggs on the twig often having a length of more than two feet.

At the time these cicadas laid their eggs in the grooves they cut in certain trees, along towards the middle of June, the effects very soon became apparent. Especially was this true in the case of all the species of oaks, chestnut oaks, and sassafras shrubs. The big twigs thus operated upon by the insect had all the leaves beyond the line of punctures die and turn a deep tan color. Some large oaks thus wounded presented a mottled appearance at a little distance, the general body of the tree retaining its normal dark green foilage, with the dead, brown patches irregularly distributed all over it. In general, the tree sustained no other injury.

Mr. S. S. Rathvor, of Lancaster, Pennsylvania, gives interesting facts in the life history of these cicadas saying, in part, referring to the eggs and young of the seventeen-year Cicada; "many people who endeavor to study the insect fail to produce the young by keeping branches containing eggs in their studios. I so failed in 1834 and 1851, and indeed I have never heard that any one has succeeded in that way who has kept them for any length of time. In the brood of 1868 the first Cicadas appeared in a body, on the evening of the second day of June. The first pair *in coitu* I observed on the 21st, and the first female depositing on the 26th of the same month. The first young appeared on the 5th of August. All these dates are some ten days later than corresponding observations made by myself and others in former years.

"On the 15th of July, I cut off some apple, pear, and chestnut twigs containing eggs, stuck the ends into a bottle containing water, and set it in a broad, shallow dish also filled with water, the whole remaining out of doors exposed to the weather, whatever it might be. The young continued to drop out on the water in the dish

for a full week. I could breed no Cicadas from branches that were dead and on which the leaves were withered, nor from those that from any cause had fallen to the ground; this was also the case with Mr. Vincent Bernard, of Kennet Square, Chester County, Pennsylvania. After the precise time was known, fresh branches were obtained, and then the young Cicadas were seen coming forth in great numbers by half a dozen observers in this country. As the fruitful eggs were at least a third larger than they were when first deposited, I infer that they require the moisture contained in living wood to preserve their vitality. When the proper time arrives and the proper conditions are preserved, they are easily bred, and indeed I have seen them evolve on the palm of my hand. The eyes of the young Cicadas are seen through the egg-skin before it is broken."

Some thirty-five years ago, the late Professor Charles Valentine Riley, an entomologist of great distinction, published an excellent cut, giving an upper view of a seventeen-year cicada, with its wings spread; two views of the pupa; a twig showing the position of the eggs, and a larva. They were all the size of nature, and the illustrations appeared later on in many kinds of publications; but for some reason the figure of the larva was omitted—perhaps for the reason that it was not quite accurate.

The writer believes it was Professor Riley who first discovered that there was in the South a thirteen-year cicada; he always believed that the seventeen-year broods were northern and the thirteen-year ones southern—the dividing line being at the thirty-eighth degree of latitude, approximately, overlaps taking place at certain points. He predicted accurately the probable emergences for certain years, and the insects did not fail him but put in an appearance in millions on schedule time.

Professor Riley pointed out that the development of the larva is extremely slow, being not more than one-fourth its full size when six years old. As it moults more than once a year, there must be some twenty-five or thirty changes of its skin when in its subterranean abode, which is not over two feet below ground during the first six or seven years of its existence. At this time it is in an oval cell which Professor Riley showed was more often away from roots than near them. Packard states: "Yet it can descend to great depths, one writer stating that he found it 20 feet below the surface. As the time approaches for the issuing of the pupa, it gradually rises nearer and nearer to the surface, and, for a year or two before the appearance of any given brood, this pupa may be dug up within one or two feet of the surface."

During the present invasion of these insects, the round holes where these cicadid nymphs came out were extremely numerous around many trees and in pathways through the woods. Upon several occasions, when turning over fallen logs, the writer discovered the pupa had made a chimney closely resembling the corresponding achievement of the common crayfish; this has been noticed by other observers. Out at Linden, Maryland, the twigs of the lower limbs of hickories, oaks, and maple-leaved viburnums were seen to be literally covered with the empty cases of the nymphs or pupæ of this cicada (Fig. 1). They also covered small cedars not over two feet in height, as well as many bushes. This was upon the 25th of May, 1919. A few of the perfected insects were distributed through these interesting and very striking groups, and the "music" of the latter had just begun in the trees and shrubbery the day before.

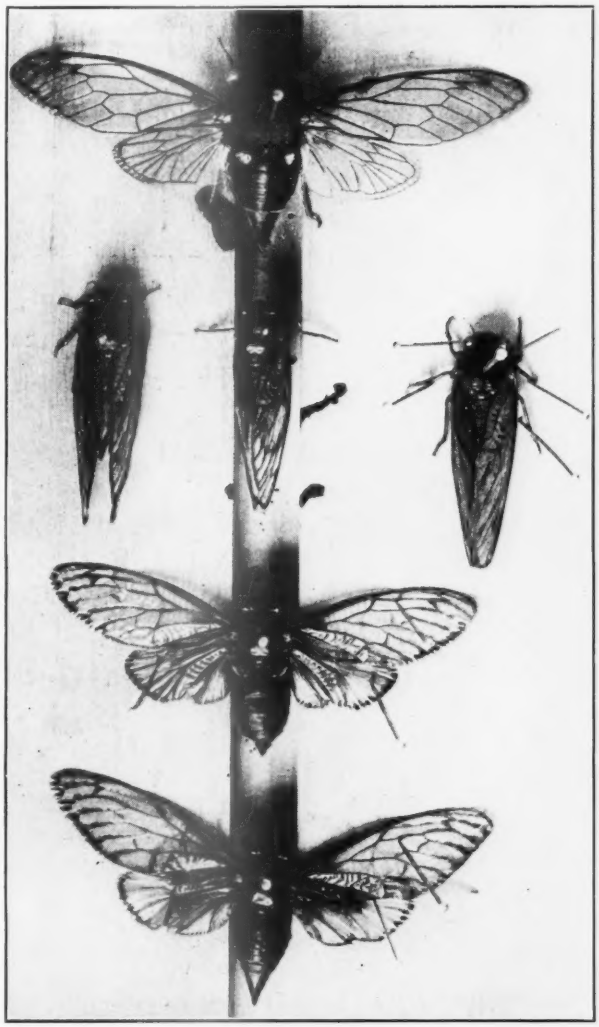


Fig. 3. DEAD CICADAS PINNED OUT ON A "SPREADING BOARD" FOR PRESERVATION IN A COLLECTION. THE LARGE UPPER ONE IS THE COMMON FORM OR "HARVEST-FLY" OF THE EAST. NATURAL SIZE. WASHINGTON SPECIMENS, COLLECTED BY THE AUTHOR (1919).

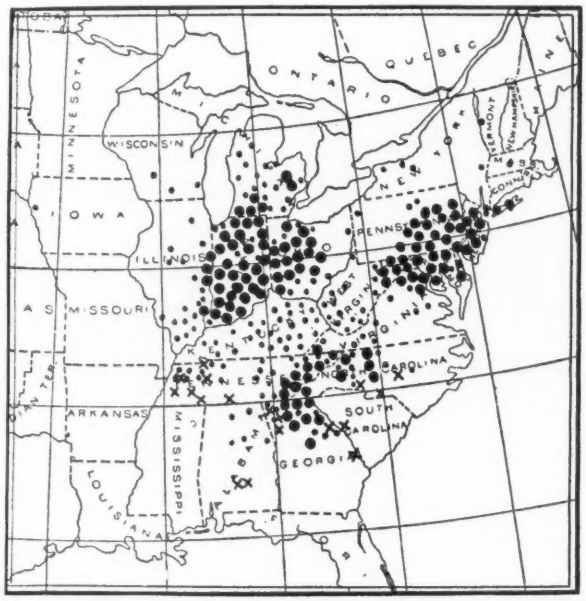
What strikes us first upon looking at one of these seventeen-year cicadas, when it is alive and in full health, is its beautiful coral-red eyes, set off by its dark greenish-black body. All about the base of its wings and costal margins of the same, the color is of a deep, rich, and very brilliant orange. The sexes are distinguished by the presence of the ovipositor in the female, which is quite conspicuous.

While this emergence was on, the writer collected over an hundred of these cicadas, with as many pupæ

and empty cases. They were carefully studied and also used for photography, the illustrations accompanying this article being made especially for it.

The nymphs dig out of the ground through the use of their strong and enlarged fore-feet, the matured insect subsequently emerging from a slit down the back. All of this is seen in Figure 1 through carefully regarding the several specimens. Sometimes we meet with cases where the insect died when only partly out of the case. In still others the wings crumple up, and the helpless insects crawl about on the ground. Probably there are also other kinds of deformities.

In flight, the seventeen-year cicada is not at all rapid, nor is that flight, as a rule, long sustained. Most often it is in a straight line or on a long curve, either ascending or descending. They are very loath to move in a rainstorm, or when wet from any cause. There is no trouble in catching the adult insects, and when held in the fingers they commonly emit a loud, humming noise; should the wings be free to move at such times, they whirl them rapidly, thus adding to the fuss they make. On even ground, this cicada walks with great deliberation, bringing the fore-pair of legs to the front with marked cicadian dignity at regular intervals. Frequently, when on the ground, one may get over on its back, when it will violently whirl its wings in its efforts to right itself again. In warm, dry weather they are far more active than when the air is chilly and damp.



MAP SHOWING THE "HOSTESS" STATES—TERRITORY IN WHICH THE PERIODICAL CICADA (LOCUST) APPEARED IN 1919. LARGE DOTS INDICATE DENSE AND SMALL DOTS SCATTERING COLONIES.

When observing children capture these "locusts" they will call your attention to the W near the upper, outer angle of each fore-wing and with a dubious shake of their heads predict that a war is near at hand. This is backed up by inviting attention to the reddish color on the wings of our larger species of cicada, where this ominous W is also to be seen. As the *Cicadidæ* have been in existence for a great many thousands of years, during which time millions of men have been slain in wars, this harmless superstition is hardly worthy of a smile. Strange to relate, however, we have many "grown-ups" among us who are firm believers in this and similar "signs."

This family of *Cicadidæ* contains many other species besides the thirteen-year and seventeen-year ones; a larger one of the eastern United States is well known. It comes along during the "dog days" of summer or a little later, and its "song" is indicative of the approach of early autumn. Rarely do we hear more than one or two of these together—in cities usually from the shade trees along the streets. The "song" has a definite beginning and ending, and is not a continuous hum as is the case with the seventeen-year fellow.

There are a number of tropical species; and out West a very cute little form, much lighter in color, that the writer has observed in thousands on the sage brush on the prairies. This probably is the one that Dr. Frank E. Lutz refers to in his work, a *Fieldbook of Insects*, when he says: "Of the genus *Cicada* (as now limited, *Tettigia*), the small *hieroglyphica* (Plate XXII.), with an almost transparent abdomen, may be found in pine barrens, and is our only species." (P. 84.)

Kirby, in his *Text-Book of Entomology*, figures *Thopha saccata*, Amyot, and says that it is an Australian insect, remarkable for the large drums of the male. It is rusty brown; the thorax is banded with black and yellow, and the abdomen is black." From tip to tip, this giant among the *Cicadidæ* measures five and a half inches.

Three very fine species inhabit China, and others are found in South Africa. The big one of the East Indies (*Dundubia imperatoria* Westw.) measures over eight inches across the spread wings!

Kirby remarks that the "Cicadas are improperly called "locusts" both in America and Australia. In countries where they abound, the larger species keep up a perpetual chirping, and they and other insects make the woods resound with their song at almost all hours of the day and night. Hence, I have been assured by travellers who have spent some years in the Tropics, that nothing struck them so much on their return to England as what seemed the death-like stillness of our woods, and that it was months, or even years, before they were able to divest themselves of the impression that it was always winter." Were such travelers able to hear the din created by the thousands of the seventeen-year cicadas "singing" in concert in the trees, they would most assuredly have but slender grounds for such complaint.

One of the very best accounts of our cicadas is given us by Dr. L. O. Howard, in his well-known *Insect Book*, fully illustrated by many of Riley's excellent cuts. These last include the "young larva" of the seventeen-year species, which stands in evidence of Doctor Howard's belief in its accuracy.

"The ultimate fate of this interesting species," says this eminent authority, "is undoubtedly extinction, and its

numbers are rapidly growing less. One of the comparatively few insects upon which the English sparrow feeds with avidity is the periodical cicada, and many thousands of them are destroyed by sparrows each time they make their appearance and before they lay their eggs." One interested in cicadas should certainly read this valuable account by Doctor Howard. According to Lutz, the adults live only a week or so, "to recompense them for the long period of preparation."

Further on the same author remarks that "there are a score, or more, of different broods, each of which has a rather definite—often restricted—distribution and time of emergence. Suppose there are three such broods in your neighborhood. One of them (that is, the adults) may have appeared in 1911; its next appearance would be 1928. Another might be 1916, 1933, and so on. As a matter of fact, these are actual broods, although they may not be the ones of your neighborhood. However, the example shows that we may have seventeen-year cicadas oftener than every seventeen years, to say nothing of the possibility of laggards or extra-spry individuals, in various broods, which do not appear on schedule time."

It has been pointed out that many thousands of these cicadas came forth on the streets in Washington. This, be it noted, could only happen where the ground, for seventeen years or a little more, had not been sealed over, either by some structure or other having been erected upon it, or by the making of cemented sidewalks and impenetrable roadways. As Washington very extensively encroached upon its former environs during the time this brood of cicadas were enjoying the seventeen years of subterranean existence, many hundreds of acres being sealed over, it is apparent that all the cicadas in those areas perhaps millions of them, could not come to the surface at the appointed time, and thus perished at the points where they arrived at such impassable barriers. It is claimed that this factor of destruction will, in time, exterminate this interesting insect—an idea that surely is quite unbelievable; though to a certain extent it may keep their numbers down, as does the extensive warfare waged upon them by the "English Sparrows" in and about our cities.

Extinction or no extinction; war or no war; sparrows or no sparrows—in the month of May, 1936, common reckoning, we shall, with absolute certainty, see an emergence of our seventeen-year cicada where the present hordes have appeared.

DR. FERNOW, DEAN OF FORESTERS, RETIRES

DR. B. E. FERNOW, Dean of the Faculty of Forestry, University of Toronto, retired on July 1. Dr. Fernow intends to return to the United States and, if his health permits, to continue his labors in authorship which have already won him much distinction. The success of the College of Forestry at Toronto mirrors Dr. Fernow's unsparing giving of himself for the advancement of the science of forestry in Canada. One cannot over-emphasize the discouragements he met and overcame in founding a new and unfamiliar branch of technical training, the youngest of the engineering professions. As a Director of the Canadian Forestry Association, Dr. Fernow was a great believer in educational propaganda and assisted it at every opportunity.

He became Chief of the Division of Forestry, United States Department of Agriculture, in 1886, a position which he filled until 1898. In addition to his official work, he was a constant promoter of all biological investigations leading to a broader understanding of the principles of forestry. In 1883 he was elected secretary of the American Forestry Association, and also held the position of chairman of the Executive Committee, and finally first vice-president of that organization. The degree of Doctor of Laws was conferred on Dr. Fernow by the University of Wisconsin in 1897. He took up his duties at Toronto University in 1907.

HOMES built of wood were practically the only structures unscathed in the severe earthquakes which devastated parts of the island of Porto Rico, according to reports made to the National Lumber Manufacturers' Association—a high tribute to the durability of this forest product in building work.

DOUGLASS "KILLED IN ACTION"

A REPORT from the Adjutant General practically confirming the death of Lieut. C. W. H. Douglass reads as follows:

"Lieut. Charles W. H. Douglass, Signal Corps, previously reported missing in action since June 11, 1918, now reported killed in action, same date." No further details are available.

Lieutenant Douglass was a graduate of the New York State College of Forestry and at the time of his enlistment in the Aviation Service, was associated with P. S. Ridsdale, editor and secretary of the American Forestry Association. His loss is keenly felt.

GRADUATES OF THE NEW YORK STATE COLLEGE OF FORESTRY GRANTED AMERICAN-SCANDINAVIAN FELLOWSHIP

MR. HENRY M. MELONEY, of Bordentown, New Jersey, who was graduated from the New York State College of Forestry, at Syracuse University, with the degree of B. S., in June, 1918, has just accepted appointment to a technical fellowship for the study of forestry, lumber, and paper and pulp manufacture in Sweden, under the American-Scandinavian Foundation. Ten college and university men from America will be sent to the Scandinavian states under the American-Scandinavian Foundation for study and research. Two of these fellowships are in forestry and the others in mining, electrical engineering, etc. The fellowships carry $1,000 and are of one year's duration. Mr. Meloney is planning to leave for Sweden in August and will specialize in lumbering and logging engineering.

Forestry for Boys and Girls

by E G Cheyney

THE PINE WOODS FOLK

SQUEAKY FINDS TWO MORE VANDALS

SQUEAKY liked to gossip about as well as anyone and he did a good deal of it when he had a chance, but there was nothing lazy about him. When there was any work to do he settled right down to business and finished the job. So when Mrs. Squeaky told him that she had located a big supply of acorns he was as anxious as she to transfer them to their store room.

"Where are they?" he asked as they bobbed off through the woods together.

"In the old hollow maple stub, right on the ground."

Squeaky stopped very suddenly and looked at her with doubt in his eye. "But Johnny Woodmouse lives there," he exclaimed.

"No, he doesn't," Mrs. Squeaky replied, proud of her news. "Porky told me this morning that Mrs. Woodmouse went out on the snow one night last winter and the owl caught her."

"But he did not catch Johnny and the children?" he asked, still hesitating.

"No, but Johnny left as soon as the snow melted, to look for another wife, and he took the children with him. They have been gone six weeks."

Squeaky no longer hesitated. He raced along with his smart little wife to the old maple stump. She disappeared between two of the big roots and he found a small hole between them that led into the big hollow stump. There must have been a bushel of acorns on the floor of the hollow.

"I did not even know that there was a ground hole into this stump," Squeaky exclaimed admiringly.

"I found a tiny little hole there in the rotten wood," Mrs. Squeaky explained proudly, "and dug it out. You see, the acorns came from up there."

Squeaky looked up and saw a small hole leading into the hollow above where Johnny Woodmouse had lived. All the acorns had run down through this hole. They started to work at once. With an acorn in each cheek and another in his teeth, Squeaky started out, but he could not make it. He had to take an acorn out of one cheek before he could get through the hole. He made a great fuss about it, but finally went on with the two acorns. While he was gone Mrs. Squeaky, who was of a more practical turn of mind, cut the hole a little larger so that her packed cheeks would go through.

Squeaky was on his second trip when he saw a junco hopping along apparently picking something out of the air every little while. Squeaky's curiosity was aroused at once. What was the junco eating? He went over that way and found that the junco was picking the seed caps off of the tiny little pine seedlings and taking the top off of the seedlings with them. Squeaky was very much excited, but he could not talk with his mouth so full. As it was against his principles to lay down a load, he hurried home with it as fast as he could go and tore back to the junco.

"Hey," he called as soon as he was within earshot, "do you know that those are pine seeds that you are eating?"

The junco looked a little disgusted. "I thought they tasted like them," he replied.

"Well, that's what they are," Squeaky cried. "They stick on top of the seedling when it comes out of the ground. Every time you pull off one of those you pull off the top of the seedling with it and kill it. We shall never have any pine trees if you go around everywhere doing that."

The junco looked at him curiously. "You eat the seed, don't you?" he asked.

"Certainly," said Squeaky, "but—"

"Well, then," said the junco as he flew away to another patch of seedlings.

Squeaky was almost stunned. He had already scolded Porky, Cottontail and the junco for destroying pine trees and now he had suddenly discovered that he had probably kept more pine trees from growing than any of them. Probably had destroyed more than anybody else, except Chatter Box.

It made Squeaky very thoughtful, but it did not stop him from hurrying on to help Mrs. Squeaky, and by evening the whole bushel of acorns was safe in their store house.

THE GULLS AND TERNS

(Family Laridae)

BY A. A. ALLEN

ASSISTANT PROFESSOR OF ORNITHOLOGY, CORNELL UNIVERSITY

TO THOSE who go down to the sea, there is no bird more familiar than the sea gull. It matters not that there are fifty different kinds of gulls in the world with as many different names. All of the long winged graceful white birds that follow the ships the world over, or congregate in large flocks in the harbors, are everywhere called sea gulls and always will be. Absolute masters of the air they are, for no storm is so severe that they cannot still be seen, now circling high overhead, now gliding close to the waves, now sailing apparently straight into the wind without a movement of the wings. Sometimes they sail for hours by the stern of the ship taking advantage of the air currents and never moving their wings except to alter occasionally the angle at which they are held. Again they are seen tossing about on the waves for they have webbed feet and can swim like ducks.

The majority of gulls are pure white except for pearl gray mantles and black tips to the wings, but some have the mantle darker, others have the head black during the summer, while still others have the entire plumage white with scarcely a mark of any kind. Immature gulls are uniformly darker than the adults, being dusky or grayish, changing gradually during the first two or three years to the plumage of the old birds.

Gulls vary in size from that of a pigeon to that of an eagle although they are always more slender than the latter. As a group they are larger than the terns though a few of the terns are larger than the smallest gulls. The majority of terns are about the size of slender pigeons but some are not much larger than the largest swallows. Indeed they are sometimes called "sea swallows" because of their long pointed wings, deeply forked tails, and light, airy flight.

Photograph by Herbert K. Job

AN AVIAN SNOW STORM

Royal and Cabot's terns nesting. Breton Island Reservation, Louisiana.

Terns do not often sail like the gulls but few birds excel them for gracefulness. With measured strokes of the wings, almost suggestive of the motion of a butterfly, and with their bills directed downward as they watch the water, they beat back and forth along the coast hunting for small fish. Once a flock of terns locates a school of fish, a scene of intense animation follows. The buoyant, rhythmic flight gives way to a series of daring plunges

and they dart from a considerable height into the sea, spearing the small fish with their pointed bills. In this method of feeding they differ entirely from the gulls which have hooked bills and feed upon dead fish that they find floating on the surface.

Gulls and terns are much alike in their nesting habits for the majority of species build crude nests or lay their eggs in simple depressions in the sand or on the rocks, with little or no pretense at nest building. In this respect and also in their eggs, which are olive or drab in ground color, rather heavily marked and sharply pointed, they are quite similar to the sandpipers and plovers. Indeed they resemble the shorebirds in other respects and in many anatomical characters as well so that most ornithologists today put all of them together in one major group or order.

Photograph by G. A. Bailey

A TERN POST

A black tern in full plumage. In this plumage it belies its name.

Photograph by G. A. Bailey

THE BLACK TERN IN SUMMER

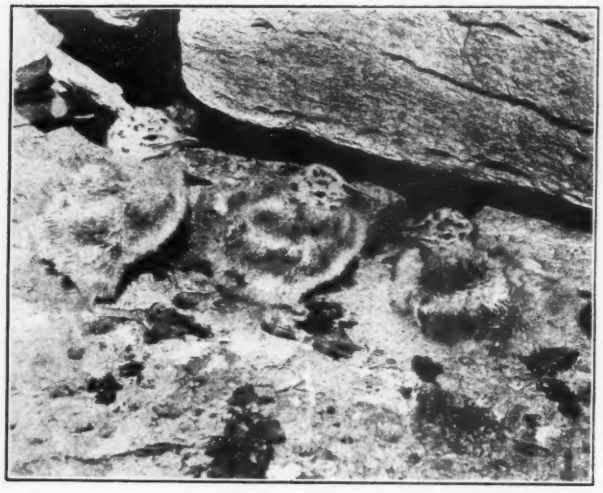
In this plumage the head and underparts are black—an unusual plumage for this family of birds.

The commonest and best known of the twenty-five species of gulls found in North America is the herring gull. It is found throughout the northern hemisphere, nesting from northern United States and northern France northward, and wintering from the southern part of its breeding range south to the Gulf of Mexico and the Mediterranean. It is common in winter in New York harbor and in other harbors, following the ferries and swooping down to pick up pieces of bread or refuse thrown into the water. It follows also the garbage scows in dense clouds and is everywhere a valuable scavenger. In the interior the herring gulls are common on all of the Great Lakes and larger bodies of water that do not freeze over, and whenever the ground is not covered with snow, they make sorties to the uplands, often long distances from water, where they find grasshoppers, beetles, and grubs. Gulls always roost on the water, however, so toward night they can be seen returning to the lake just as they left it in the morning. While on the lake, in addition to picking up dead fish, they occasionally rob the loons and mergansers. Sometimes a dozen or more gulls hover over the spot where these birds are fishing waiting for one of them to make a catch, and then they will swoop down at it before it has time to swallow its prey. Usually the gulls are so persistent that the diver finally drops the fish, and the gulls fall upon it and begin fighting among themselves. The herring gulls

Photograph by G. A. Bailey

A SIMPLE HOME

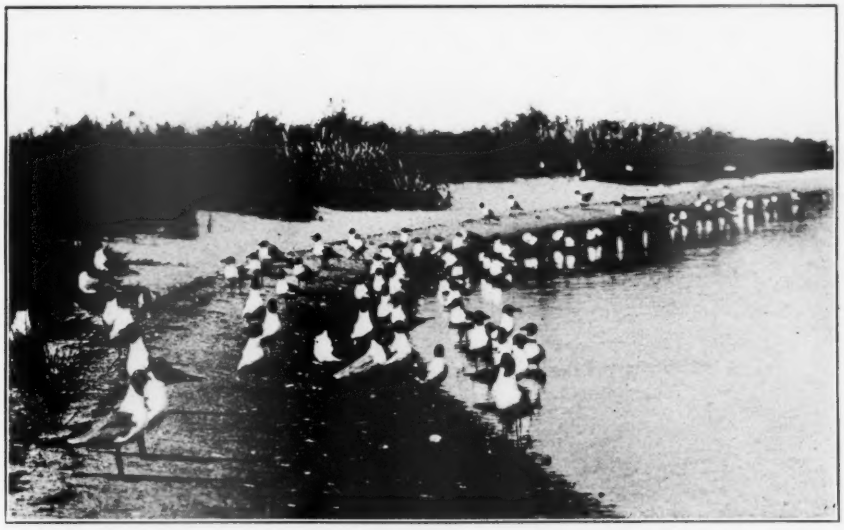
The gulls build crude nests and the terns usually none. This is the nest of a Caspian tern on an island in Georgian Bay.



Photograph by G. A. Bailey

CAMOUFLAGE IN NATURE

Young gulls and terns are almost impossible to see against the lichen covered rock. Here are three young herring gulls.



Photograph by Herbert K. Job

"AN OFF HOUR FOR HOUSEKEEPERS"

Laughing gulls, Breton Island Reservation, Louisiana.

usually select a rocky island for a nesting site and pull together small piles of drift weed for nests. They usually lay three eggs which vary from drab to olive or bluish white in ground color, irregularly spotted with lilac and shades of brown. The young birds are covered with down when hatched, and, like the adults, are able to swim. They are cared for by their parents, however, until they learn to fly. Their downy coat is mottled with buff and gray so that when they crouch they are almost invisible against the lichen covered rocks.

A somewhat smaller and more migratory species is the ring-billed gull which scarcely can be distinguished from the herring gull at any distance. It migrates as far south as Mexico and Central America and rarely winters as far north as New York State. The chief difference between it and the herring gull is that in the adult plumage, it has yellow legs instead of pink and has a black band across its bill. The immature birds can be distinguished at greater distances because the ring-billed gull has a pure white tail marked by a subterminal black band while the immature herring gull has half or all of the tail dark.

A somewhat smaller and more maritime species is the kittiwake, so called from its note. It has nearly the same pattern of coloration as the herring and ring-billed gulls with more or less black on the flight quills. Three larger species, the glaucous gull, the Iceland gull, and the Kumlien gull are distinguished by the absence of black on the primaries. These are northern species found rarely on our coast in winter and they can be distinguished from one another only by experienced observers. A more distinctly marked large gull, in fact the largest of them all, is the great black-backed gull which differs from all the others in having the mantle a deep slaty black. It is a martime species and seldom visits inland waters.

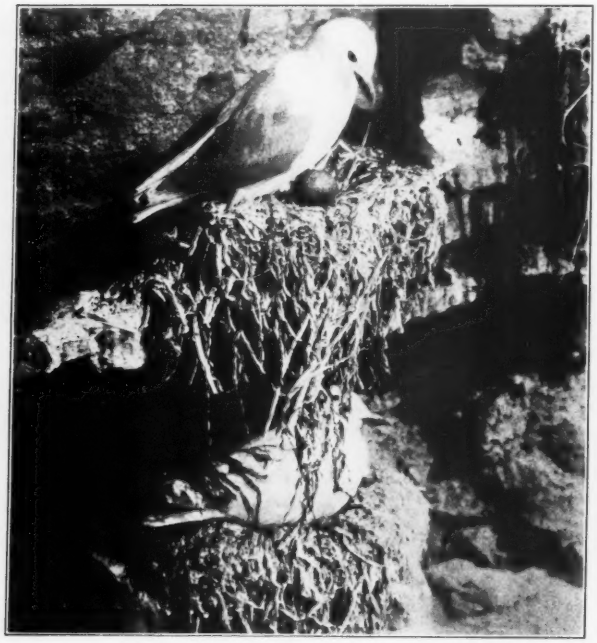
The smallest of the North American gulls is the Bonaparte's gull which in its breeding dress has the entire head slaty black. It takes at least two years to acquire this plumage, however, and it is worn only during the summer so that white headed birds are much more often seen. It is more migratory than the other species, nesting in the far north and seldom wintering north of the Southern States, many individuals continuing their winter rovings to Mexico and Yucatan.

A more southern black-headed gull is the laughing gull which nests in the salt marshes along the coast from Massachusetts south to Venezuela, retiring in winter to the Gulf coast and even to Brazil. This denizen of the South is somewhat smaller than the ringed-billed

Photograph by Herbert K. Job

THE GREATEST OF ALL TRAVELERS

Arctic tern on nest. This bird is said to migrate 22,000 miles a year. Matinicus Rock, Maine.



Photograph by Herbert K. Job

ON THE SEA CLIFFS

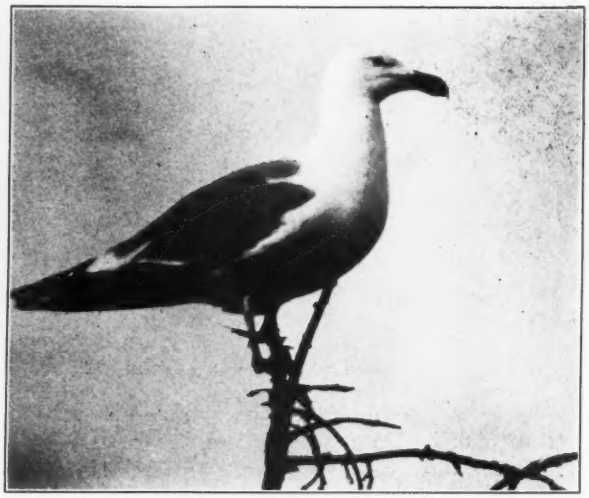
Kittiwakes, nesting on Great Bird Rock, Magdalena Islands.

gull but considerably larger than the Bonaparte's.

In the Mississippi valley and west to the Rockies there is a very similar black headed species called the Franklyn's gull. It is the least maritime of all the gulls, reaching the sea coast only during its winter quarters, which stretch from Louisiana to Peru and Chili. During the summer it frequents the prairie country feeding principally upon locusts and other insects, often following the plowman for the grubs that are turned up by the plough. It is this species that the Mormons believe saved their first settlers from starvation by consuming the black crickets which threatened to destroy all their crops. Indeed they have recently erected an elaborate fountain and monument in Salt Lake City dedicated "to the gulls which saved the early settlers from starvation."

Along the Pacific coast there are three common species, the glaucous-winged, the western, and the California gulls, which are not found in the east. They are white-headed species, not strikingly different from the herring gull.

Ten of the fifty species of terns known to science are found in North America. They are easily distinguished from the gulls by the points already mentioned but many of the species are distinguished from one another only by the closest observation. The commonest color pattern is similar to that of the gulls being largely white with pearl gray mantles, but in the breeding season all the typical species have the whole top of the head black. Most of them, likewise, have deeply forked tails. They vary in size from the least tern which is not much larger than a swallow, to the royal and caspian terns which are about



Photograph by Herbert K. Job

AN UNUSUAL PERCH FOR A GULL

Herring gull solicitous for its nest, Matinicus Island, Maine.

Photograph by Herbert K. Job

LIKE A MANTLE OF SNOW

Royal and Cabot's terns nesting, Breton Island Reservation, Louisiana.

the size of ringed-billed gulls. The caspian tern is a somewhat larger species than the royal and has a less deeply forked tail. It is likewise more northern in its distribution. The common tern (or Wilson's tern), the Forester's tern, the Arctic tern, and the roseate tern are all much alike being about fifteen inches long and having the typical tern coloration. They are, however, somewhat different in habits and distribution, the common tern being the most widespread and generally seen. Close observation will distinguish the Arctic tern by its grayer underparts and uniformly deep red bill, the common tern by its white throat and grayish breast, and bill, red only at the base. The Forester's tern can be distinguished by its pure white underparts and dull orange bill and the roseate tern by its delicate tint of pink on the underparts.

The Arctic tern is the most maritime of them all and is said to have the longest migration of any bird, some individuals nesting well within the Arctic Circle and some wintering well within the Antarctic, requiring an annual pilgrimage of about 22 thousand miles. The Forester's tern is more of a western species and is more marsh loving than the others, nesting in grassy marshes. The common and roseate often nest together on some of the islands off the Atlantic coast but the roseate is more southern of the two extending its breeding range to northern South America. The gull-billed tern is a nearly cosmopolitan bird but is found in North America only as far north as Virginia. It is quite easily identified by its short heavy bill and less deeply forked tail.

The least maritime of all the terns is the black tern which frequents the marshes of the interior. It is easily distinguished in its breeding dress by its black head and underparts but during the winter these are white and it is not so different from the other terns except that its upperparts are darker.

There are two tropical terns, the sooty tern and the noddy tern which are common on the Florida keys and some of the islands off the Gulf coast where they nest in colonies of thousands. The sooty tern can be distinguished from other terns by its black upperparts and the noddy tern by its black underparts, as well as upperparts, only the top of the head being white.

In the days when the feather trade was at its height, thousands of tern skins of all species were shipped to the New York markets and the breeding colonies all along the Atlantic coast were almost wiped out. Indeed even after some of the nesting islands were set aside as refuges and protected by wardens, hunters congregated in boats near the islands and baited the birds up to them. In this way they were still able to kill hundreds of them because the terns have the unfortunate habit of hovering over a wounded companion and returning again and again, even though shot at, as though they would succor him. It was not until through the efforts of the National Association of Audubon Societies and a few far-sighted Senators and Congressmen that the non-sale of plumage laws were passed. These laws forbade the sale of the plumage of native birds, and made it possible to save the few remaining terns. Now the birds are beginning to increase and to nest where they have not been found for years. The least tern alone, seems unable to recuperate from the verge of extermination to which it was forced and it is still a rare bird all along the Atlantic coast where once it was extremely abundant.

CITY TREE PLANTING

ALDO LEOPOLD, secretary of the Chamber of Commerce at Albuquerque, New Mexico, tells how that city conducted a tree planting campaign which offers valuable suggestions to other commercial organizations. The first step was to appoint a committee of private citizens experienced in tree planting. This committee drew up a set of specifications embodying the consensus of their opinions as to the best species of trees to plant and when, the best size of stock, and the exact methods of shipment, storage, distribution, planting, and the after care which is necessary to produce the best results under the conditions existing in Albuquerque. The specifications were then published in the local newspapers, and private parties were asked to submit bids, giving the cost per tree for which they would agree to meet the specifications. On a given date all bids were reviewed by the committee, and those bidders whose prices were reasonable were investigated as to their personal reliability and experience and the reliability of the nursery with which they did business. Certificates of recommendation were then issued to all the bidders who, in the opinion of the committee, were fully qualified to do the work.

The committee then appointed a trained forester as inspector. The certificates of recommendation stipulated that any work not complying with the specifications as interpreted by the inspector would result in the forfeiture of the certificate of recommendation. All holders of certificates were then encouraged to proceed to solicit business in the regular manner of private contractors.

These certified contractors commanded the confidence of the public and were aided by an extensive advertising campaign. This was conducted by the Chamber of Commerce with the full co-operation of the local newspapers. Large numbers of trees were ordered by property owners who had in former years deferred tree planting because they were not satisfied with the service rendered by unregulated contractors. A total of over one thousand trees were planted, and so far 95 per cent of them are growing and doing well. Under the extremely difficult conditions obtaining in the Southwest, this is a very exceptional showing. The public is well satisfied. The annual planting of trees will be at least trebled, and the contractors state that they will never work under any other system.

A FOREST FIRE IS A REAL ENEMY

Carelessness causes many fires. Are you careless? Never leave your camp fire without making sure it is completely out. We won the war to defend Democracy. Must we now fight forest fires? Areyou careful with fire in the forest? Burning matches cause fires. Break your match in two before throwing it away. If you discover a forest fire, put it out.

EDITORS TAKE UP FOREST MATTERS

NEWSPAPERS ANSWER CALL OF AMERICAN FORESTRY ASSOCIATION AND OPEN COLUMNS TO DISCUSSION OF BIG QUESTIONS

A NATIONAL forest policy for the United States, "Roads of Remembrance," plans for reforesting France, Belgium and Great Britain, and the planting of Memorial Trees, for all of which the American Forestry Association is campaigning, have received the hearty indorsement of the editors of the country.

In an editorial on beautifying the roads of the country the Atlanta *Constitution* outlines the suggestion of the American Forestry Association and says, "This is an excellent idea. The movement in all its phases is commendable and it is one to which the public should give hearty indorsement." The Association urges that County Units plan memorials of various kinds with the good roads in mind so the memorials be easy of access and that the roads for which millions are to be spent be marked with memorial trees. "The advantages of having highways set with trees are a great many," says the Worcester, Massachusetts, *Gazette*, "and few undertakings of so small comparative cost are calculated to give as big a return for the money invested as the planting of trees along the highways wherever such work is practicable."

Fruit trees are advocated for roadside planting by the Portland *Oregonian*, and so are nut trees. "This is an established custom in Europe," the *Oregonian* points out, "and a practice worth thinking about." The Pittsburgh *Post* praises the Boy Scouts for planting walnut trees and adds: "This is particularly timely in view of the warning just issued by the American Forestry Association that the country faces a timber shortage." The Columbus, Ohio, *Dispatch* says: "If the people of this country do not begin planting black walnuts they will make the mistake of their lives." The *"Haskin Letter,"* a feature used by many newspapers, carries a column on "Roads of Remembrance," pointing to the opportunity to beautify the country and at the same time impress the need of a national forest policy. The Washington *Times* and the Washington *Herald* give generous space to the article and the Washington *Star* uses nearly a column in telling of the Association's suggestion for tree planting along the drive to connect two of Washington's famous parks. Dr. Frank Crane, in his daily editorial, used by about one hundred of the biggest newspapers, indorses the Association's Memorial Tree campaign.

In an editorial, "Trees as Memorials," the Boston *Post* says: "The sentiment is one which appeals directly and strongly to the heart of our people. The American Forestry Association is aiding the governments of Great Britain, France and Belgium in their schemes for repairing the forest devastation wrought by the Hun and compelled by their own military needs. To restore and beautify the world for which our boys fought and sacrificed so bravely is their best and most enduring monument." The London *Mail*, speaking of the ravaged forests, says: "England in one regard looks strangely like those parts of Belgium where the Germans have resided. You see wherever you go acres of sawdust chips in place of vanished forests." The *Mail* then goes on to give the plans of Mr. Acland, of the Woods and Forest Department. Under the heading "Trees for France," the Goshen, Indiana, *Democrat* says: "It is a practical suggestion. America can send almost any desired variety of tree or shrub." The Indianapolis *Star* points to "a recent survey of the forests in France by the secretary of the American Forestry Association," and adds that "the situation presents a tremendous problem not only for the nations involved but for other countries as well." "America's natural resources have been the salvation of Europe," is the way the Boston *Globe* puts it, while the Buffalo *Evening News* quotes the figures from the American Forestry Magazine to show the need of increased planting. The Baltimore *Sun*, Minneapolis *Journal*, New York *Times* and many other papers quote the magazine for a column on the destruction of the forests in the battle areas. The Dayton *Herald* quotes the Association's "Dont's" for forest fires and points to the need of a national forest policy, saying, "Only the United States lags." The San Francisco *Examiner* uses an eight column box across the top of the first page on a telegram of congratulation to San Francisco upon the dedication of its Hero Grove. These are but examples of the way the editors of the country are co-operating in the drive for a national forest policy.

CALL TO MEMBERS

Enlist for service with YOUR ASSOCIATION. The need of a national forest policy will be doubly impressed upon the editor of your paper if you point out this need to him. Write a short statement of facts, sign your name as a "member of American Forestry Association," and send the copy to the editor of your newspaper.

Discuss local park and tree situations with the editor for he wants to know the public opinion and values it highly. Where trees need attention tell him and you will find ready response, for the editors of the country are keen to help.

FORESTRY—THE RELATION OF WOOD TO THE DEVELOPMENT OF CIVILIZATION

BY WILLIAM CARSON

WE HEAR much and read much of the Coal Age, the Iron Age, the Age of Steel—and their influence on civilization. In our own time we have been impressed with the amazing changes brought about by iron and steel. We traverse continents on rails of steel; span broad rivers with bridges of iron and steel; ply the seven seas in ships of steel, and soar through the air in machines with steel frames. With steel tools and machines the luxuries of yesterday are brought in reach of all, adding immensely to the comforts and enjoyment of life; and with other steel tools we fashion guns that hurl masses of steel twenty miles through the air and kill myriads of men. Truly the influence of iron and steel has been stupendous—stupendous beyond our conception.

Yet, though iron and steel are mere tyros as compared to wood, no period has been designated the Wood Age. No particular period could be. Wood has contributed to all the ages. And though its functions have been in the quieter walks of life, less glorious and spectacular than iron and steel, its contribution to man in his struggle onward and upward has been no less bountiful.

Even before the dawn of history, man was dependent on it for his existence; and on every frontier down to our own day it has been one of man's chief reliances. It has been more than an influence; it has been essential—indispensable. Man first took refuge in the tree and with its branches built his fire to cook his simple meal. With his wooden club he went forth to provide food for himself and his family. He lightened his first journeys with a staff of wood, and as he became more venturesome floated down the water-courses on a log. When love of home conquered his roving disposition he scratched the ground with a stick and sowed his seeds, and in time made his first plow of wood. As the cen-

Courtesy of The White Pine Bureau

THE "OLD FAIRBANKS HOUSE" AT DEDHAM, MASSACHUSETTS

The oldest house in America now standing in practically its original condition, again with the possible exception of the shell and adobe houses of Florida and California, is the "Old Fairbanks House," at Dedham, Massachusetts, the central section of which was built in 1636. The picturesqueness of this old, weather-beaten house, nestling beneath a wealth of overhanging elms and breathing the sweetness and charm of old New England, has an appeal unequalled by any other of the early Colonial houses. Although its unpainted white pine siding has stood exposed to the severe New England climate for almost three centuries, it is still almost perfectly preserved—a testimonial to the lasting qualities of wood.

turies wore away and the great migrations came, wood was once more destined to play a leading role. On wooden wheels and in wooden boats man went forth to the ends of the earth—from Asia westward to Europe—and from Europe across the Atlantic to the New World.

As man pushed forward the frontier of civilization, commerce grew. We marvel at the millions of tons of freight transported annually on steel rails and steel ships; but centuries must pass before steel's tonnage can equal the traffic that has gone up and down the highways of the earth in wooden ships and on wooden wheels.

But wood has done more than provide man with his necessities and comforts. His earliest efforts in sculpture and carving were formed from wood. There stands today in the Gizeh Museum in Egypt a wooden statue, the oldest record of man's achievement in sculpture. If Moses saw it, he must have looked upon it in wonder, for it was 2000 years old before he was born. We think of wood as something perishable, as something that soon decays; yet here is a wooden statue, 6,000 years old—older than any stone or marble statue in existence. In passing it may not be amiss to remark that the oldest living things on earth are the giant Sequoia trees of California.

And in music—from the first hammerings on a wooden tom-tom to the symphony orchestra—wood instruments have thrilled man in all ages. No instrument of brass can produce the range and variety of tones or approach the human appeal of the wooden violin. The metal strings of the piano get their tone and quality from the white pine sounding-board.

Sometimes, too, I surmise that wood has been rather lavishly used in making the heads of some of our statesmen.

In this land of ours, wood—and especially white pine—has been a powerful influence in shaping her destiny. When the colonists came to New England and New York they found an abundance of white pine distributed over the country. The ease with which it could be worked made it readily accessible for sheltering the settlers and their stock. And later it gave expression to their culture and love for the beautiful in those stately houses and those dignified churches which still stand as sound as when they were built and give inspiration for so many of the beautiful architectural designs of today.

The history of the early Colonies repeated itself in the upbuilding of the great Middle West. The pioneers who came to the Mississippi Valley settled along the rivers and creeks where there was timber available or where it could be transported by water. The necessity for wood, with which to build their homes and barns, and for fuel, kept them from the more fertile prairies ready for the plow that lay back from the streams. As the settlers became more numerous the great white pine forests bordering the Great Lakes and the Mississippi, Chippewa and St. Croix Rivers were tapped, and they have ever since been serving the needs of the country. Fortunate indeed were the settlers to have such an abundant supply of wood that was light, easily transported, easy to work, durable and good for practically all uses to which a soft wood can be put.

It is impossible to conceive the development of the Middle West without the white pine forests of Michigan, Wisconsin and Minnesota. Certain it is that the fertile plains of this great granary must have lain unproductive many years longer had not such an adaptable building material been so close at hand. And think what it means today that this vast region is producing food for us and for our Allies. The products from "the bread-basket of the world"—from the country of white pine houses and white pine granaries—may save civilization from the deadliest attack ever aimed at its progress.

And in this world crisis we of America and our Allies once more turned to wooden ships to save the day—to keep the supply of food unbroken for those who fought with us that democracy might rule the world and that all peoples might live together in peace and justice. Wood has been a powerful factor in the upbuilding of civilization—and we in our day have seen it one of the deciding factors in saving that which it has through the countless ages so laboriously helped to build.—(*White Pine Monograph.*)

USE OF CUT-OVER LANDS

A PRELIMINARY study of cut-over timberlands in the south, with a view to determining their best utilization, is being planned by Dr. H. C. Taylor, chief of the new Bureau of Farm Management of the Agricultural Department, and Dr. L. C. Gray, head of the new Division of Land Economics in that Bureau. Cooperation in this work is expected from State authorities, especially those connected with state agricultural colleges and experiment stations, and also from the various organizations interested in the development of the south.

The work this year will be limited by the appropriations made by Congress for the Bureau of Farm Management, which are not as large as requested by Secretary Houston.

In considering the problem of utilizing southern cut-over lands to the best advantage, it is planned to first mobilize data already in the possession of various branches of the government that bear upon the subject. If funds admit this will be followed up next year with a more extended investigation in a number of localities in the southern states. These investigations should include an intensive study of certain questions related to the colonization and development of cut-over lands and this should result in assembling a mass of detailed data that will be of great use in bringing about agricultural development in the southern states, particularly the coastal plain area extending from Virginia to Texas, in which is situated the bulk of the pine stump lands.

R. B. MILLER has been appointed State Forester of Illinois and assumed his new duties on July 1. The state forestry work is under the direction of the State Natural History Survey Division and is located at Urbana.

STATE NEWS

MINNESOTA

THE Minnesota Forest Service is just closing a deal with the Pine Tree Lumber Company for the purchase of approximately 6,000,000 feet of virgin pine timber within the boundary of Itasca State Park, the consideration, $13.00 per thousand for white and Norway pine, $9.00 for spruce and $5.00 for jack pine; the land, about two thousand acres, together with the miscellaneous timber will constitute a gift to the State. It is valued at $25,000 to $30,000. One of the groves on this land, a magnificent stand of Norway and white pine, has been named the "Theodore Roosevelt Grove."

Itasca State Park and Forest was well provided for by the 1919 Legislature. As a result, the summer hotel property at Douglas Lodge has been greatly improved, a number of new buildings are being erected, including a large restaurant, to be known as the "Forest Inn." An electric light plant has been installed, thus reducing a considerable element of fire danger, fourteen sections of land on the west side of the forest will be bought, the necessary money being provided for the purpose. The State Forester has just arranged for the grazing of one bunch of sheep, twenty-two hundred head, along the west edge of Itasca Park and Forest. The Forester has contended for some time that the grazing of sheep in this kind of country, where there is so much grass, weeds and brush, would afford the best kind of fire protection. It is believed also that little, if any, harm would be done in the woods, since stock will not eat the little coniferous trees so long as there is an abundance of other forage. There was some question as to the advisability of permitting sheep grazing because of the possible effect on game range, but the location of the grazing area with respect to the feeding grounds of the deer safeguards this feature. Also, on account of the late entrance of the sheep, there will be no danger of their trampling the nests of ground-nesting birds. There is another feature worth watching in this connection. It has been difficult to obtain natural reproduction of pine in portions of Itasca Park owing to the dense growth of brush and small vegetation. There is a probability that sheep grazing will bring about more favorable conditions for pine reproduction through a partial removal of the brush and trampling of the soil to prepare it for the seed.

If this experiment works out satisfactorily, it will be the beginning of a great industry in that part of the State because there is range for several millions of sheep during the summer months. Sheep might be brought from Montana and other Rocky Mountain States about the first of July, fattened on the abundant forage in the timber country of northern Minnesota and then sent to the stock yards of South St. Paul and Chicago. The Forester is convinced that the forest fire danger in Minnesota will be greatly reduced with the increase of stock grazing in the wooded districts. Fires in the woods do not run readily and are easily controlled wherever the grass, weeds and under brush has been even moderately eaten down by stock.

MARYLAND

WITH special war activities practically concluded, the Maryland State Board of Forestry has well under way numerous new projects of prime importance to forest owners and timber users of that State. The summer's field work has been arranged to develop various brand—new and useful activities, and to push to completion projects already undertaken.

An intensive study of willow culture, with new opportunities opened by the war, will shortly be finished and published. Volume tables have been or are being prepared for every commercial tree species in Maryland. Thousands of taper measurements of hardwood and softwood trees have been secured in sections of the State where these varieties reach commercial importance. Sets of curves are built on these at headquarters, and in the very near future Maryland will have its own volume tables to use and enjoy. These will be published, and made available to all requiring accurate, and localized, information in measuring, buying and selling forest products. They will not only include, as usual, lumber and cordwood, but will be made applicable also to all forest products for which each tree is fitted and used, in board feet or cubic contents. State co-operation is being extended forest owners in the practical improvement of their timbered holdings, foresters from the Board directing marking and estimating, and if necessary supervising cutting, on tracts from a few to several hundred acres in size. This work is well received, since it secures the owner reproduction of the best, removal of the poorest, and sale of material for what it is worth. In connection with and in extension of this, experiments in cheap and effective tree-killing are under way, methods employed, both old and new, being by mechanical and chemical means. Proper treatment of public trees is still assured through application of Maryland's Roadside Tree Law, and active supervision of all operations by the Board.

Profiteering landlords who charge too much for summer cottages have been hit a body blow by free camp sites on Forest Reserves. The State's five Forest Reserves are open with few and easy restrictions to those feeling the summertime call of the wild. Camp sites have been selected, marked, and made ready by the State. Getting your "pick" is free of red tape; all the camper has to do is sign an application, send it in, and pitch his tent.

In co-operation with various private companies and progressive individuals, experiments in Loblolly pine reproduction on the Eastern Shore are being carried out. Information desired is on the best methods of securing N. S. R. in Loblolly. Sample plots are carefully laid out, and results will be watched until conclusive.

Ten years ago Maryland's wood-using industries were the subject of research and report. Recently, knowing these results to be old and the data no longer authentic, the Board took up a canvass of the subject. Much interest was manifested by the various industries approached, and practically 100 per cent co-operation gained in the preparation of a new and complete report, well illustrated, on "The Wood-Using Industries of Maryland." It is now in the hands of the printer, and will be issued shortly. Both study and subsequent report represent, exclusively, State work.

NEW JERSEY

FOR several years State Forester Alfred Gaskill has been urging owners of woodland to give their timber a little care and attention, in order that its value and productiveness might be increased. It has been the practice in this State and elsewhere to cut off the woods without care or thought of the future, and then allow Nature to do the best she can in replacing the abused timber growth. The following results of a "thinning" experiment in the so-called "scrub oaks" of Burlington County prove that such attention is profitable.

A portion of the Lebanon State Forest was selected for the demonstration. The tract consisted of a rather dense stand of young oaks from ten to twenty feet tall, growing on sandy soil of low fertility.

Two similar plots of approximately one acre each were laid out, and the trees on each counted and measured. Then plot No. 1 was "thinned" to relieve its overcrowded condition. Enough crowded, weakened and suppressed trees of the poorest species were removed to give the remaining trees the proper amount of light and growing space for their best develop-

125 MILLION FEET
NATIONAL FOREST TIMBER
FOR SALE

Location and Amount.—All the merchantable dead timber standing and down, and all the live timber marked or designated for cutting on an area of about 6,000 acres of Government land in T. 44 N., R. 4 E.; T. 44 N., R. 5 E., and T. 43 N., R. 5 E., within the watershed of Fishhook Creek, St. Joe National Forest, Idaho, estimated to be 33,000 M. B. M. green white pine; 9,000 M. B. M. dead white pine; 30,000 M. B. M. Engelmann spruce; 13,000 M. B. M. cedar; 12,000 M. B. M. white fir and hemlock; 10,000 M. B. M. larch and Douglas fir; 5,000 M. B. M lodgepole pine, balsam fir and yellow pine saw timber, 60,000 cedar poles, more or less; and an unestimated amount of cedar posts, piling and shingle bolts. About 4,000 acres of privately owned timber in the same watershed is also available for purchase from the Northern Pacific Railway Company.

Stumpage Prices.—Lowest bid considered $2.50 per M for green white pine; $1.00 per M for spruce and yellow pine; 50 cents per M for all other species and dead white pine; and special rates for cedar products of various dimensions.

Prices will be readjusted at the end of the third, sixth, ninth and twelfth years.

Period for Removal.—A period of fifteen years will be allowed for the removal of the timber, with two additional years within which to construct initial improvements.

Deposit.—With bid, $10,000.00 to apply on purchase price if bid is accepted, or refunded if rejected. Ten per cent may be retained as forfeit if the contract and bond are not executed within the required time.

Final Date for Bids.—Sealed bids will be received by the District Forester, Missoula, Montana, up to and including September 23, 1919. The right to reject any and all bids is reserved. Before bids are submitted, full information concerning the character of the timber, conditions of sale, deposits and the submission of bids should be obtained from the District Forester, Missoula, Montana, or the Forest Supervisor, St. Maries, Idaho.

ment. Plot No. 2 to serve as a check or control, was not thinned.

Seven years later, in June, 1919, neither tract having had any attention except protection from fire, the plots were again measured and the following results were noted: Plot No. 1 (thinned plot) had 380 living trees, the volume of which was 10.03 cords per acre, or an increase of 5.57 cords, not counting the one cord removed by thinning. Plot No. 2 contained 558 living trees, with a total volume of 8.63 cords, or an increase of less than a cord (.91 cords) for seven years' growth. In other words the thinned plot almost doubled its wood volume in seven years, while the adjoining unthinned plot in the same time increased less than nine per cent. Forestry pays! The State Forester is ready to help anyone interested in such a project.

KENTUCKY

J. E. BARTON, Commissioner of Geology and Forestry, announces at this time that the Kentenia-Catron Corporation will transfer to the State of Kentucky for use as a State Forest Reservation approximately 3,400 acres of land on Pine Mountain in Harlan County. The gift of this land to the State is in fee simple, subject only to existing contracts for the removal of certain timber on the area. The gift is made through Mr. Charles H. Davis, the President of the Company, and Mr. W. W. Duffield, Agent of the Company for Kentucky. The gift of this land to the State for purposes of a state forest is the biggest stimulus to the management of timber tracts under effective forestry principles that the movement in the State to this end has yet seen. The Kentenia-Catron Corporation has always had a keen interest in the forestry problems of the State and the concrete way which they have now taken to show this interest is worthy of their efforts heretofore in the same direction. The area has a mixed stand of hardwoods, common to the region, and includes some pines. The management of this tract on scientific forestry principles will serve as an excellent example of what can be accomplished under these conditions in the Southern Appalachian region. Active steps will be taken to put the area under effective administration at an early date. Immediate measures will be taken looking to the protection of the timber on the tract from fire and other destructive agencies.

ILLINOIS

THE Quincy, Illinois, High School has a forestry club, the purpose of which is to save the trees we have now and to plant others. A Science Club, of the same city, composed of twelve or fifteen enthusiastic nature students, has secured a small tract of land and is growing on it such forest trees as pecan, persimmon, walnut and chestnut, which are to be transplanted to suitable locations as the club members take their weekly hikes.

The University of Illinois has an experimental forest tree plantation begun in the spring of 1871 from which some interesting data should now be secured. An appropriation of $1,000 was made in 1869 by the Legislature for trees and seeds. Thirteen acres were planted on prairie soil under the direction of Prof. T. J. Burrill, horticulturist and botanist, and G. W. McCluer, M. S., assistant horticulturist. It is located at the experimental farm, on Lincoln Avenue. Forest records were kept for 1871, 1872, 1876 and 1886 by Professor Burrill, in which are stated the amounts expended for plants, planting, cultivation, etc., and the receipts from thinnings. European larch, elms, spruce, white pine, soft maple, basswood, black walnut, Bur oak, red oak and hickory are the species which have done best. The forest is fenced and is used to some extent by the residents of Urbana as a park.

GEORGIA

EXTENSION Forester Zimm devoted the month of July to the Extension Schools, which are held in connection with the District Agricultural Schools. One phase of the work which Mr. Zimm is emphasizing is the preservative treatment of fence posts, shingles, and other farm timbers, and he has succeeded in establishing a small treating plant for demonstration purposes at each District School.

Vocational work in forestry and agriculture is receiving considerable attention at the Georgia State College of Agriculture. Approximately 150 rehabilitated soldiers have been sent to the College for special work and the Vocational Board states that preparation should be made to accommodate a total of between four and five hundred.

In connection with the program for Highway Construction and Improvement, to be conducted co-operatively by the State and the Federal Government, the Georgia State Highway Commission has recommended that the establishment of roadside trees be given consideration at the same time. The Georgia State Forest School, through the Extension Forester, has agreed to cooperate with the Highway Commission in this phase of road improvement.

A bill introduced in the Georgia General Assembly provides for the placing of all forestry matters in the hands of the Board of Trustees of the Georgia State College of Agriculture and empowering the Board to appoint a State Forester. The bill is the result of a conference of interested persons of the State and Mr. Peters, of the U. S. Forest Service. It is believed that the passage of this bill will enable the State to give proper attention to this most important of all natural resources—the forest. The bill has the enthusiastic support of the lumbermen of the State.

Creosoted Water Tanks—Home-Made—

The species and condition of wood specified for the creosoted water tank, shown below, permit employment of the Open Tank Process either at the shops of consumers or at the mills.

Loblolly pine is available at many isolated mills, which because of their location cannot economically supply lumber treated by pressure process. However, they could equip themselves to creosote by the Open Tank Process—*providing they will meet the necessary requirements of seasoning and framing.*

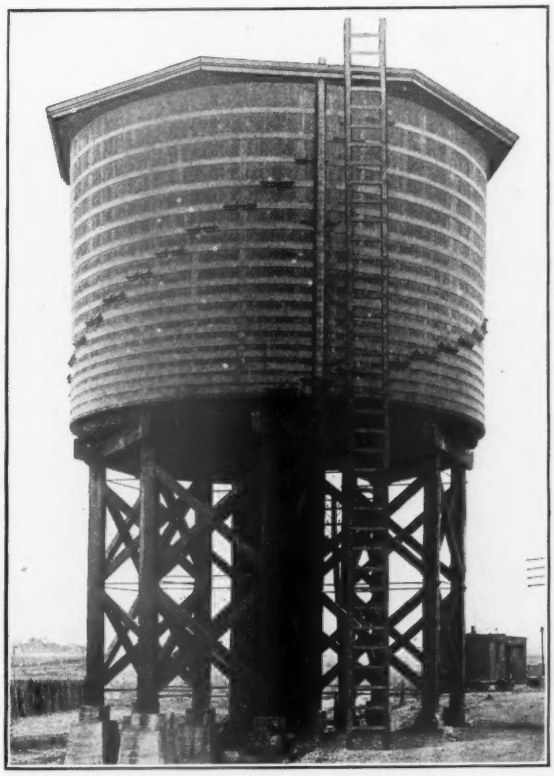
Lumber and timber, as specified, can be purchased from many sources by consumers, manufactured as required and creosoted by the Open Tank Process with Carbosota Creosote Oil, either at the *building site* or *shops*. The treating tanks, etc., required for creosoting can be made portable or stationary.

The Open Tank Process is *not* recommended as a substitute for the empty-cell pressure processes, where the latter is practical, but as a means of creosoting and making this grade of lumber available for the purpose, under conditions where the empty-cell pressure process cannot be employed.

The Open Tank Process *is* efficient and comparatively economical, but requires a refined, coal-tar creosote oil. That means Carbosota Creosote Oil which conforms to U. S. Railroad Administration Specification R-828-A.

Carbosota is merely a trade-mark which guarantees an absolutely uniform, highly refined, pure, coal-tar creosote oil, physically fit for non-pressure treatments, and chemically of the highest preservative value.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be air-dry. In regions of moist, warm climate, wood of some species may start to decay before it can be air-dried. Exception should be made in such cases, and treatment modified accordingly.)



Knowles Type Creosoted Water Tank erected at Mattoon, Ill., by the Illinois Central R.R. (Creosoted by Empty-Cell-Rueping Process 5 lbs. A.R.E.A. No. 1 Coal-Tar Creosote Oil per cubic foot.)

THE salient features of this type of tank, and the several factors that warrant recommending the Open Tank Process, are quoted from an address by C. R. Knowles, Supt. of Water Service, Illinois Central Railroad, published by the Southern Pine Association, in a pamphlet entitled "Southern Pine Tanks."

"The timber used in Loblolly Pine, coming under the general specifications for tank timber except that no restrictions are made as to heart or sap. The timber is air seasoned, and should be permitted to season for three months in favorable weather."

"A very important feature in the construction of these tanks is that all timber more than 1 inch in thickness is framed before treatment to secure the maximum life from the treated timber. The work of framing the tank before treatment, is given such careful attention that it is rarely necessary to bore a hole in the treated timber during the field erection of the tank."

"In water tanks, however, there is always an intermediate condition of moisture in which the wood is dry on the outside and wet on the inside, thus promoting rapid decay."

"It is difficult to point out any portion of the tank more susceptible to decay than another, although decay in the tops of the staves is more noticeable, and the timber probably decays more quickly here than in any other part of the tank."

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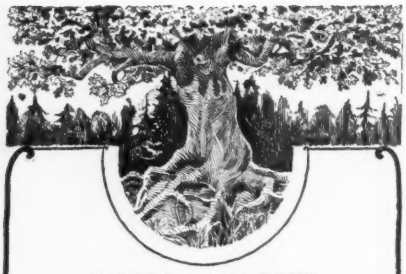

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SALE OF TIMBER, KLAMATH INDIAN RESERVATION.

CLIFF BOUNDARY UNIT.

SEALED BIDS, MARKED OUTSIDE "BID, Cliff Boundary Timber Unit" and addressed to the Superintendent of the Klamath Indian School, Klamath Agency, Oregon, will be received until 12 o'clock noon, Pacific time, Tuesday, September 23, 1919, for the purchase of timber upon about 10,000 acres within Townships 33 and 34 South, Ranges 7 and 8 East of the Williamette Meridian. The sale embraces approximately 100,000,000 feet of yellow pine and sugar pine. Each bid must state for each species the amount per 1,000 feet Scribner decimal C log scale that will be paid for all timber cut prior to April 1, 1924. Prices subsequent to that date are to be fixed by the Commissioner of Indian Affairs by three-year periods. No bid of less than three dollars and seventy-five cents ($3.75) per 1,000 feet for yellow and sugar pine and one dollar ($1.00) per 1,000 feet for other species of timber during the first period will be considered. Each bid must be submitted in duplicate and be accompanied by a certified check on a solvent national bank in favor of the Superintendent of the Klamath Indian School in the amount of $10,000. The deposit will be returned if the bid is rejected but retained if the bid is accepted and the required contract and bond are not executed and presented for approval within sixty days from such acceptance. The right to reject any and all bids is reserved. For copies of the bid and contract forms and for other information application should be made to the Indian Superintendent, Klamath Agency, Oregon.

Washington, D. C., July 14, 1919. CATO SELLS, Commissioner of Indian Affairs.

PLANT MEMORIAL TREES FOR OUR HEROIC DEAD

CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF FOREST ENGINEERS

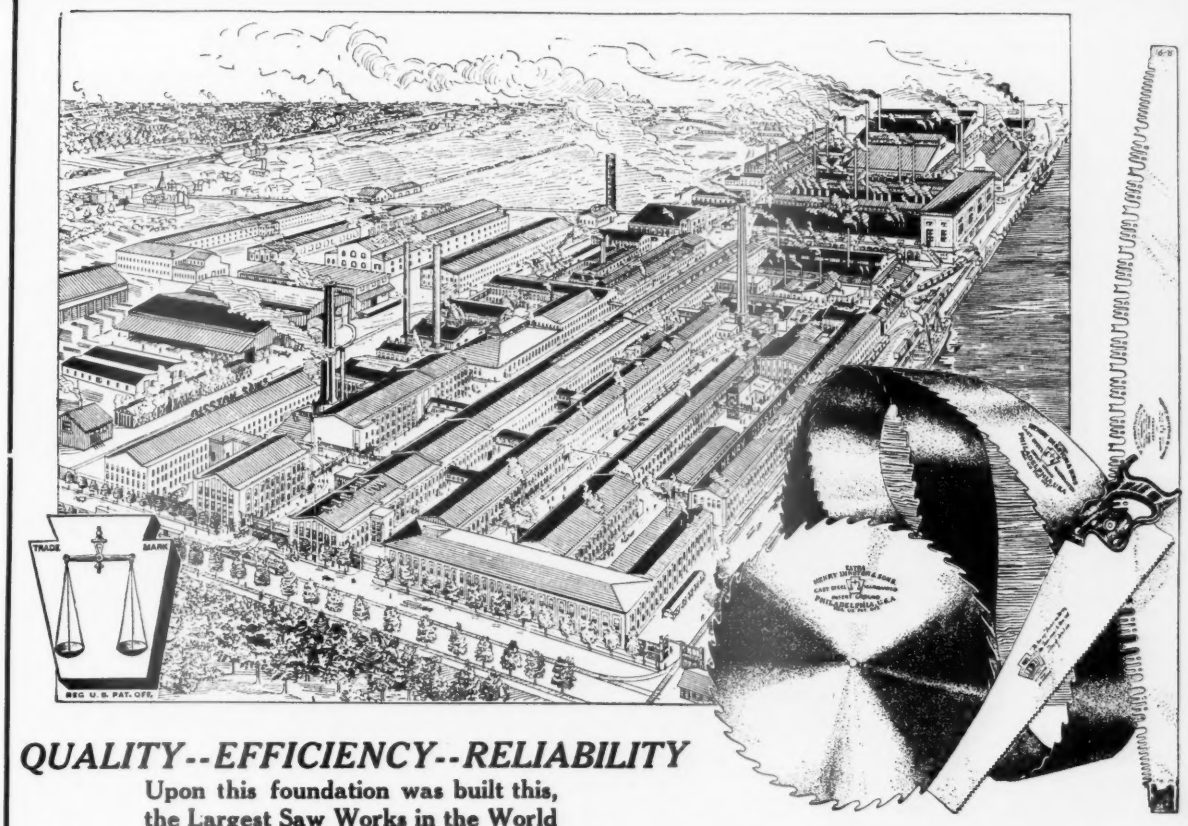
AT the summer meeting of the Woodlands Section of the Canadian Pulp and Paper Association, mentioned in our last number, a discussion of vital importance to the forests took place. The work of fire prevention for the past seven years has shown conclusively that cut-over areas are the most liable to have fires started in them, and once started these fires are the most difficult to extinguish and do the greatest amount of damage. A few years ago when the areas cut over each year were comparatively small and often widely separated, a fire in a lumbered area only destroyed a small section, but now that the yearly cut has so increased, over two hundred per cent, and whole river valleys now are practically cut-over the situation is becoming very serious and some steps must be taken to dispose of the debris from logging. It is the general opinion of foresters and many lumbermen that the present method of cutting to a diameter limit is unwise, unscientific and wasteful. The coniferous trees, being shallow-rooted blow down, the remaining hardwoods soon form a dense cover and prevent the growth of the conifers and those trees which are left under the supposition that they will form a future crop, if they do not blow down, make practically no growth as they were, for the most part, suppressed. It has also been shown that where clean cutting of conifers and most of the hardwoods is practiced, a dense growth of spruce and balsam appears at once. The proper method to be adopted should be that of clean cutting of both conifers and hardwoods, brush burning and then management of the stand. By management is meant the proper thinning of the natural regeneration and the removal from time to time of the undesirable species. The time has certainly come when we should realize that to get the most out of the forest we must handle it according to the proper principals. Forest farming has its rules just as agriculture has and they must be followed and must be applied by men who know them and who have the necessary technical training. We can no longer continue to treat our forests as mines and use up our forest capital. Methods of cutting must be revised, slash must be disposed of and systems of management put into practice if we are to have forests in the future.

Clyde Leavitt, Forester to the Commission of Conservation and the Dominion Railway Board, was operated on in Ottawa, June 25, and at last reports was doing very well.

Mr. F. W. Reed represented the U. S. Forest Service at the meeting of the Woodlands Section and took part in the discussion. Mr. Sterling, of James D. Lacey and Company, and Mr. R. S. Kellogg, of the News Print Service Bureau, were also present. Mr. Craig, of the Commission of Conservation; Mr. G. C. Piche, Chief Forester of Quebec; Mr. Prince, Chief Forester of New Brunswick; Mr. R. H. Campbell, Director of Dominion Forestry Branch; Mr. Avery, of the Spanish River Pulp and Paper Company; Messrs. Yberg and Jewett, of the Riordon Pulp and Paper Company; Mr. Galarneau and Mr. Nix, of the St. Maurice Paper Company; Mr. Cressman, of the Wayagamack Pulp and Paper Company; Mr. Sweezy, of the Royal Securities Company; Mr. Kiffer, of the Quebec Forest Service; Captain Tremblay, of the Donnacona Paper Company; Mr. Schanche, of the Abitibi Power and Pulp Company, and Messrs. Arnold Hannsen and R. W. Lyons, of the Laurentide Company, were among the Canadian foresters present.

The new classification of the Canadian Civil Service has just been published and the salaries for foresters are so low that no man who has taken four years at college and a technical two years' course thereafter can afford to work for the Dominion Government. Foresters have been rated lower than any other professional men. The result will be that the service will soon lose all its good men. Salaries in many cases are far below those that the present incumbents are receiving and in one case a position has been reclassified and will hereafter receive less than its present holder received on commencing nearly ten years ago. The schedule is as follows:

Some comparisons are of interest. The Dominion Entomologist is to receive $3,900 to $4,800; the Dominion Foresters, $3,600 to $4,500. A geologist is to receive $3,300 and *UP;* a forester, $1,680 to $2,100. The Director of the Forest Products Laboratory is to receive only $3,120 to $3,600. In most cases Provincial Governments are paying better salaries, as do also private concerns. Practically the whole of technical staff of the Forest Products Laboratory has been engaged by private concerns. As inevitably the management of Government Forests must come into the hands of technical men, and as they constitute such a



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THE AMERICAN FORESTRY ASSOCIATION has undertaken the great task of helping to reforest the shell-torn, war-shattered areas of France; and to aid also Great Britain, half of whose forests were felled; Belgium, whose forests suffered terribly, and Italy.

The great humanitarian need, the prime economic importance, the broad constructive value of this work—all place it on a plane which gives it striking pre-eminence. Therefore, it is felt that every member of the American Forestry Association will desire to have a part, and as big a part as possible, in carrying out this program.

BY those who are competent to judge, it is asserted that the forests of France kept the Germans from Paris. How great a debt, then, does the world owe to them!

AMERICA can build no nobler memorial in Europe than by replacing the devastated forests of France, Great Britain, Belgium and Italy. ¶Answer this appeal at once by sending your check for whatever amount you can afford, to the American Forestry Association. It will help to purchase the seed needed to replant the forests of our Allies.

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HOW TO PRUNE YOUR TREES

Always use a pole saw and pole shears on the tips of the long branches.

Do not "head back" or cut off the top of a tree except where the tree is old and failing, and then under special instructions.

Be as sparing and as judicious in pruning as possible, and do not raise the branches so high as to make the tree look like a telegraph pole.

Commence pruning the tree from the top and finish at the bottom.

Make every cut as close and parallel to the trunk as possible.

To make the cut perfectly smooth the saw must be well set and sharp.

Leave no stubs, dead and dying wood, or fungus-covered branches behind you.

Do not fail to cover every wound with coal tar, not allowing it needlessly to run down the trunk.

Do not remove several large branches on one tree at a time. They must be removed gradually, the work extending over several seasons.

large share of the natural wealth of the country the effect of putting such responsibilities on the shoulders of second-rate men will be disastrous.

The patrol flights of the seaplanes of the St. Maurice Forest Protective Association have commenced and are proving practical. It is easily possible to locate forest fires at forty to fifty miles and if they are not too far from a lake or a river the plane crew can descend and extinguish them. A forester who made a flight recently reports that the various timber types can easily be distinguished and that photographs taken from the air will make most satisfactory maps.

Forest fires of large size are reported in the Cochrane and Cobalt districts and some cut pulpwood is reported destroyed.

The *Aftenposten*, a daily newspaper published in Christianis, Norway, has an article on Silviculture and Social Conditions in Canada, which refers to the work of the Laurentide Company and gives photographs of its nursery and reclamation work. It says that labor conditions in Canada are better than those in Norway and that Canada is getting ahead of Norway in forestry matters. The article was written by Mr. W. Rolsted, who is in charge of the Royal Forests.

The Province of New Brunswick has issued a circular letter appealing to school teachers and pupils to co-operate in preventing forest fires and to try and tell people how they can aid this great work. It explains how to build and extinguish a camp fire, how to notify a fire ranger in case a fire is discovered, and describes the uses and necessity for keeping our forests.

In forestry, as in every other movement for better conditions education is the most important thing. Legislation, especially if repressive, arouses antagonism, and often defeats its aim. Education of all, from the child to the adult, brings the best and quickest results. The writer is reminded in this connection of an incident which he witnessed while living in Switzerland. A bill was brought before the legislature for compulsory old age insurance. A few months before the bill was to be voted on the government sent around to every city, village and hamlet, lecturers who discussed both sides of the question impartially, giving figures of the cost of such a scheme, the results attained in other countries and all possible information. When the time came for the vote, the people knew just what they were doing and had thoroughly discussed the thing among themselves. It has been said that for twenty years forestry propaganda has been carried on in the United States and is still without appreciable result. The trouble has been that the propaganda has not reached the people and has not been sufficiently intensive. It has been too technical and has not aimed at one reform at a time. It has tried to cover the whole field. People who have always been interested in the forest are reached but the great mass of the people see the question still as one of more or less academic interest only. It must be brought home to them more directly.

DAVEY TREE SURGEONS

Estate of Mrs. A. M. Booth, Great Neck, Long Island, New York.

W. G. Woodger, Garden Superintendent, Mrs. A. M. Booth Estate

The tribute of W. G. Woodger to Davey Tree Surgery

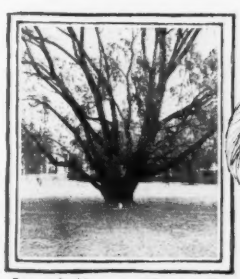
Broad Lawns, Great Neck, Long Island, New York.

The Davey Tree Expert Co., Inc., Kent, Ohio.

Gentlemen: I felt it my duty to write you a few lines in praise of the work of your representative and men on several fine trees on the estate of Mrs. A. M. Booth, most especially the very fine work done on a grand willow tree, not quite two years ago.

My employer is most gratified with the work and thinks there is no equal to The Davey Tree Expert Company. The men are extremely keen on their work and know it thoroughly. I am very interested in their work and think them worthy of great praise.

Yours truly,
W. G. WOODGER,
Garden Superintendent.



Loss of this magnificent willow would have been irreparable. Note below how Davey methods have bound the branches together with rigid steel rods, and filled the cavities sectionally with concrete to allow for the swaying of the tree

The saving of priceless trees is a matter of first importance on every estate. Davey Tree Surgery is a fulfillment of the maximum expectations of those who love and value trees. A careful examination of your trees will be made by appointment.

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FOREST DESTRUCTION PREVENTED BY CONTROL OF SURFACE FIRES

(*Continued from Page 1264*)

from five to fifty years, the periodical rotation depending upon the local rate of litter accumulation. The litter is then too wet to cause crown or ground fires.

2. Do not light fires in the forest litter after the humus becomes dry. A wet humus serves as an index to the safe firing season and prevents ground fires.

3. Do not light fires while a high wind is prevailing.

4. Burn the snags in mid-winter when the conditions are unfavorable for fires.

5. Fire the lodgments of litter while conditions are still unfavorable for surface fires.

6. Light the first fires over the areas of least litter and least density of stand.

7. Backfire from the barriers. These barriers may be roads, trails, canals, barren and cultivated areas, recently burned-over areas, bodies of water, ice and snow, and barriers scraped for the purpose.

8. Burn over the southerly slopes while the snow is on the north slopes.

9. Burn downward from the tops of the slopes.

10. Fire the ridges before the slopes and the slopes before the ravines.

11. In initiating fire control, the order of burning should be as follows for a five year rotation:

1st year—Standing dead trees.
2nd year—Ridges.
3rd year—South slopes.
4th year—North slopes.
5th year—Ravines.

These rules will often conflict and require a logical interpretation to fit the local conditions. No firing should be done without a thorough investigation of the litter conditions, topography, barriers, species and ages of trees and a study of the fire resistance of various species of trees. Standing dead snags, fallen trees, underbrush, limbs, cones, leaves, needles, weeds and any dead and inflammable material should be included as litter.

The importance of fire as a silvicultural agent in the coniferous forests has been recognized in that it has become the general practice to burn over cuttings to insure reproduction. The fires must be confined, of course, to moderate surface fires as would be possible if the foregoing rules are used. Fire is an aid to reproduction as it creates favorable conditions for the germination of the seeds, by removing competition, preparing the seed bed, opening the closed cones and releasing the seeds, temporarily driving away seed eating rodents, and removing insects and fungus. Fire serves to keep a forest clean and healthy by removing the insects and fungus diseases which have their origin in the rotting litter on the forest floor. The use of fire is a silvicultural method particularly adaptable to the coniferous forests because of their great fire resistance and the fire favors the more valuable species and the high-limbing sports. A young conifer tree will withstand the intense heat which kills all but the topmost branches and the effect is similiar to that in the pruning of a fruit tree—more vigor is put into the trunk and the new growth.

Our attempt to maintain the non-fire policy has shown that forest fires are inevitable where the forests contain a large proportion of inflammable litter. The destruction by fire increases as the litter increases. "Fire prevention," so called, simply delays the burning up of the last conifer tree where it stands.

The use and control of the surface fire is the solution of the fire problem in the coniferous forests.

PIGEONS WILL PROTECT FORESTS.

THE War, Navy and Interior Departments, according to information just received by the Manufacturers Aircraft Association, New York, are co-operating in the forest patrol. The idea of such a guard against timber fires occurred simultaneously to the Forest Service and to the air service of the Army. Now comes the Navy Department with the offer to establish pigeon lofts in the forest reserves and to provide the forest airplane patrol with carrier pigeons whose duty it would be to carry messages direct to home relief stations whenever a fire is discovered.

The pigeon branch of the Navy is expanding under the direction of Lieutenant McAtee, and recruits are now sought for this service, which is so closely akin to aviation that it is under the same general administration.

During the war there was no opportunity to train men for this important duty, but now a special school has been opened at Anacostia and twenty enlisted men are receiving daily instruction in the training and keeping of carrier pigeons. At the same time these men have opportunity to put their learning to practical uses.

The pigeon branch of the Navy has 2,500 birds. Plenty are available for the forest patrol. Experiments are going on constantly in the effort to increase the efficiency of the birds. Pigeons took an important part in naval warfare overseas. It has been proved that pigeons can fly at a speed at least equal to that of a sea plane or flying boat.

A REAL COMPLIMENT.

"We have been a member of your Association for some time and receive from month to month your magazine, which is certainly an up-to-date periodical along the line for which it is intended. We congratulate you on the work you are doing in the Association in educating the people as to the necessity of not only conserving the present standing timber but also the possibility of producing new growths."

HAINES LUMBER COMPANY.

BOOK REVIEWS

"The Book of the National Parks," by Robert Sterling Yard. Charles Scribner's Sons, New York. Price, $3.00. The author of this book possesses all the attributes necessary to contribute to the success of such a work, being an official in the Department of the Interior and so thoroughly informed on his subject, as well as a writer of note and an enthusiastic lover of the out of doors. His book is a valuable contribution to the slowly growing literature on our national park system. It will fill a long-felt want, carrying, as it does, in interesting fashion, an account of the historical, scenic, geologic and recreational features of the parks; and treating in a popular way the geologic and other scientific features. It is well illustrated and has 15 maps and diagrams.

"Timber: Its Strength, Seasoning and Grading," by Harold S. Betts. McGraw-Hill Book Company, New York. Price, $3.00. The preface states that this book is intended primarily for engineers, manufacturers and users of lumber and of various special classes of wood material, and students of engineering and forestry. Much technical information in readily accessible form is available regarding almost every class of structural material with the exception of wood, and this book will in large measure supply this deficiency.

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AMERICAN FORESTRY will gladly print free of charge in this column advertisements of foresters, lumbermen and woodsmen, discharged or about to be discharged from military service, who want positions, or of persons having employment to offer such foresters, lumbermen or woodsmen.

POSITION wanted by technically trained Forester; college graduate, 37 years of age and married. Have had seven years' experience in the National Forests of Oregon, California, Washington and Alaska. Also some European training. At present employed on timber surveys as chief of party in the Forest Service. Desire to make a change and will be glad to consider position as Forester on private estate, or as city Forester. Will also consider position as Asst. Superintendent of State Park and Game Preserve in addition to that of Forester. Can furnish the best of references. Address Box 820, care American Forestry Magazine, Washington, D. C.

ARBORICULTURIST is open to an engagement to take charge of, or as assistant in City Forestry work. Experience and training, ten years, covering the entire arboricultural field—from planting to expert tree surgery—including nursery practice, and supervision in the care and detailed management of city shade trees. For further information, address Box 700, care of American Forestry.

POSITION wanted by technically trained Forester. Have had fourteen years experience along forestry lines, over five years on the National Forests in timber sale, silvicultural and administrative work; three years experience in city forestry, tree surgery and landscape work. Forester for the North Shore Park District of Chicago. City forestry and landscape work preferred, but will be glad to consider other lines. Can furnish the best of reference. Address Box 600, Care American Forestry Magazine, Washington, D. C. (1-3)

YOUNG MAN recently discharged from the U. S. Navy, wants employment with wholesale lumber manufacturer; college graduate; five year's experience in nursery business; can furnish best of references. Address Box 675, Care American Forestry Magazine, Washington, D. C. (1-3)

WANTED: Young forester, preferably married, for clearing and maintaining woodland on small estate, operating private nursery, etc. Will pay $80 or better, depending on qualifications and experience. Six room residence on state road included. Address Box 750, c/o American Forestry Magazine, Washington, D. C. (7-9-19)

WANTED—Position as MANAGER of WOODLANDS; thirty years' experience; will care for, replant and develop woodlands. Roy Maguire, Box 810, care American Forestry Magazine, Washington, D. C.

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TABLE OF NATIVE MAINE WOODS

NINETEEN different kinds of native Maine woods are used to make a handsome and unique table for the Directors' and General Conference Room in the offices of the Eastern Forest Products Association at Bangor. The table is eight feet long and three feet wide with five legs. The top is made of six boards six inches wide, of the following woods; white ash, birdseye rock maple, black cherry, curly yellow birch, beech and quartered white oak.

The legs are of elm, hickory, chestnut, butternut, and mahoganized yellow birch. The ledge boards are of sycamore, white birch, brown ash and cherry birch. Under the margin of the top is a plate to give a thick top effect which is made of white pine, hemlock, white cedar and red spruce. With the exception of the mahoganized leg, each piece is in natural finish and the effect is beautiful.

The table was the idea of H. G. Wood, Executive Secretary of the Association, and was made by Morse & Company, at Bangor, a member of the Association. The boards of birdseye maple and curly birch are exceptionally choice and are said by many to be the handsomest they have ever seen.

PLANT MEMORIAL TREES

FALL IS THE TIME TO PLANT NARCISSUS AND TULIP BULBS

TULIP bulbs should be planted in October, preferably about the middle of the month, and narcissus bulbs may be planted up to the middle of October, but preferably about the first of the month, according to specialists of the United States Department of Agriculture.

The bulbs should be planted in loose, rich soil, devoid of rank, or unrotted, or poorly incorporated manures. It should be dug to a depth of from 12 to 15 inches. The tulip bulbs should be set 5 inches apart and 4 inches deep and the narcissus bulbs about 10 inches apart and 5 inches deep.

If they are to be grown in pots or window boxes, light rich soil should be used. Place 1 to 2 inches of cinders or broken pots in the bottom of the pots or boxes to insure good drainage. After planting, place the pots or boxes out of doors and cover them with about 4 inches of ashes or sand; or they may be placed in a dark cool room or cellar for a few weeks, until the bulbs have formed a quantity of roots. They may then be brought into the light and heat for flowering. Keep the soil well moistened from time of planting, but avoid overmoistening, for if kept too wet the bulbs will decay.

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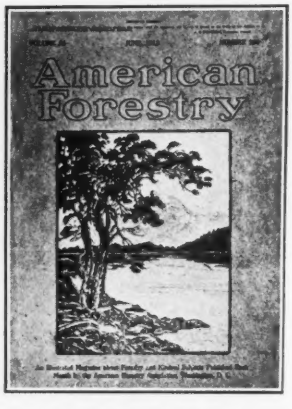

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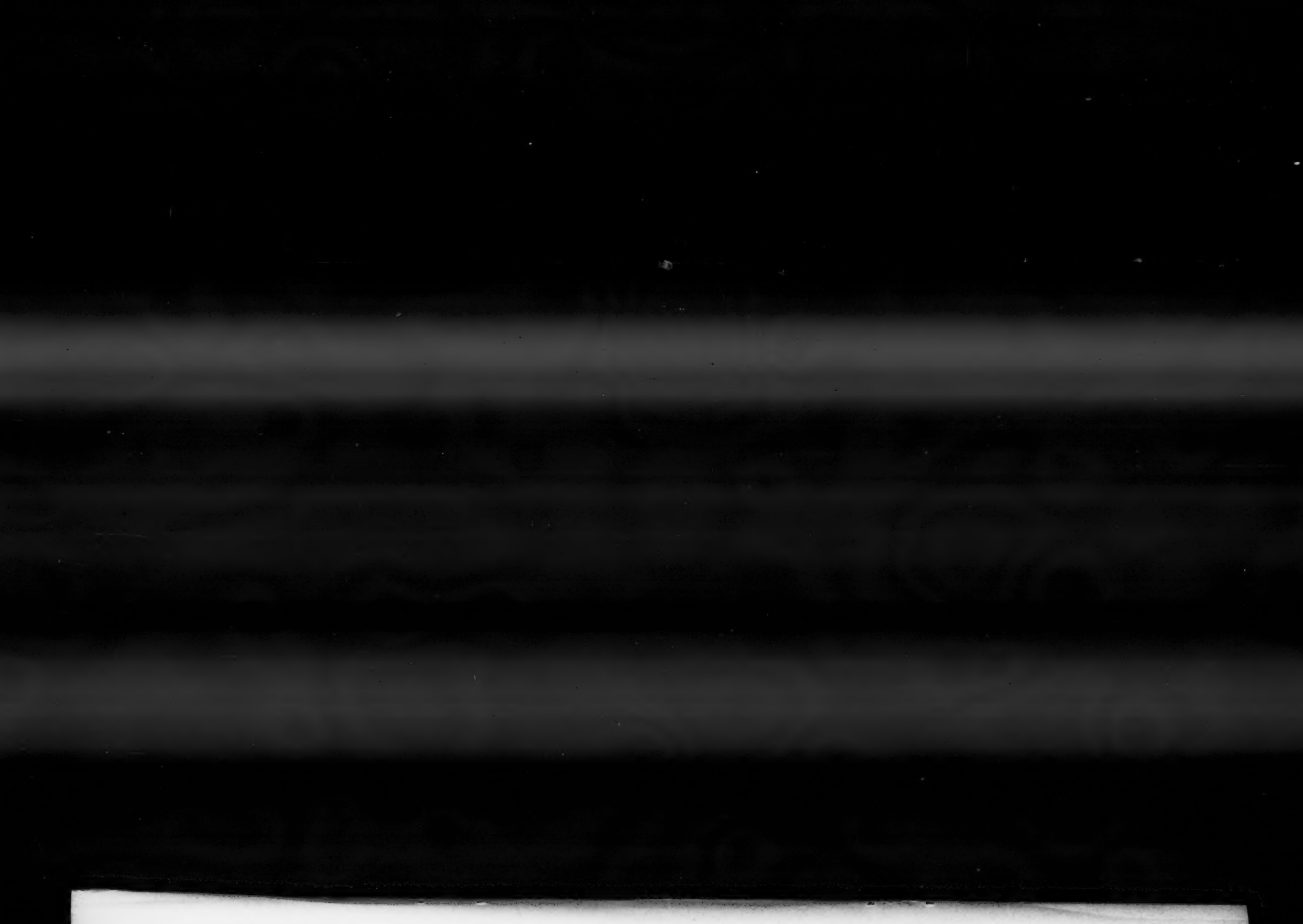
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